

LABOUR WARD IN NORTHERN UGANDA

A locally rooted human centered approach

Master's Thesis

Aalto University - School of Arts, Design and Architecture

Mariana Rantanen



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ABSTRACT

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techniques to safer health facilities
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This thesis work proposes a design for a 100-births per month labour (maternity) ward in the North of Uganda, a low-resource setting challenged by socio-economic and political instability, deteriorated health infrastructure, lack of staff and resources, low accessibility to health services and erosion of medical ethics. The proposal is an addition to an existing medical centre located in Kitgum, Uganda. The region is seeing a rapid growth in population and in need of Maternal and Child Health Facilities to accommodate that growth and help reduce the high maternal and neonatal mortality rates.

The architectural aim of this thesis is to design a labour (maternity) ward that spatially supports the woman and the companion's journey through the facility, from admission to discharge, with a focus on local materials and techniques. Design principles such as natural ventilation, natural light, companion flow, hygiene and privacy strategies have been explored and applied given the remarkable absence of these concepts in current facilities. The wider societal aim is to shift privacy standards of contempo-

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rary facilities towards a more personal and intimate experience, through allowing the presence of a companion in all stages of the process.

The work of this thesis has been structured in an initial research phase, followed by a one-month field trip in which research methods like interviews and workshops have been applied to collect data about the current health situation as well as traditional materials and techniques, and a design phase that has started while still on site.

To sum up, this work offers a building that intends to reframe women's birthing experience and raise awareness around innovative ways to improve the quality of care while still preserving traditional techniques, skills and materials.

Keywords: labour ward, maternity, low-resource settings, health facility architecture, local materials

PROLOGUE

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This thesis work came about as follow-up of a previous project done in collaboration with M4ID in 2015-16, called Lab. Our Ward Project (<http://labourward.org>). The main focus of this project was to rethink the maternity journey in low-resource settings, making it a smoother, safer and mother-centered experience. The team was multidisciplinary and working in three main ‘think tanks’ which were categorised into Space, Product and Service Design. The Space team was composed by Helena Sandman, Kanika Frings and Petter Eklund. As this work was a conceptual prototype model that used Zanzibar as a low-resource setting reference, the goal of my thesis consequently became to materialize and test the research and concepts developed and how they would work in a real scenario, considering the actual needs of an existing health facility and consulting the doctors, nurses and women in Kitgum, Uganda.

After the project has been published and available online, Dr. Andrew Wright contacted us with the interest of implementing a labour ward in the existing Yotkom Medical Center in Kitgum, Uganda. This turned into an opportunity to expand and

mature the research and concepts developed and it fast became Master’s Thesis material.

From that point onwards, I started progressing with my own focalized research and planning the next steps. In order to be able to conduct workshops and interviews on site, I had the opportunity to work with Yuri Fukamati, who is a Master’s student in Aalto focusing on participatory design methods in architecture. With her help I was able to plan better beforehand some of the interviews and workshops. Another important collaborator in the process was Veronica Bluguermann, who is a service designer with experience in healthcare design research projects and global maternal health. Veronica has helped me on site for one week, on behalf of M4ID’s own research on applying the project to reality.

This thesis work has become to some extent a real project with parts of it being implemented in the near future. It has been a rewarding experience to learn how to adapt conceptual models to complex realities.

A big thank you to Helena Sandman who has made this thesis work possible. I'm grateful for your guidance, mentoring, support, inspiration and friendship. You have given me the possibility to work with a real case and real people which has brought me more motivation and priceless learning experiences.

Thank you to my supervisor Pirjo Sanaksenaho, who has always given me useful advice and feedback along the way.

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00

introduction



“The built environment influences health. As a species, humans need structures for physical shelter as manifestations of social and cultural values and as embodiments of spiritual and emotional needs.”¹

.....

As Guenther and Vittori emphasize, architecture has a big impact on how we feel and even more so when in a vulnerable condition such as giving birth. Our built environment may change how we behave and how we deal with highly emotional situations.

Architecture can also play an important role in developing alternative, low-technology and attainable strategies that considerably enhance not only the user’s experience but the building’s performance in its context. Integration has also been a key driver, adopting local cultural trends and materials, with an innovative improvement, supporting local labor in order to achieve a strong yet localized structure.

In the article “Healing Architecture”, Lawson suggests that the prosperity of healthcare environments is highly connected to architectural design and the last twenty years have been a period of important investigation and experimentation. He says that there are “factors under the control of architects that can make significant differences to patient satisfaction, quality of life, treatment times, levels

of medication, displayed aggression, sleep patterns, and compliance with regimes”².

The organization of labour wards is often fragmented and unclear, making it difficult for women to move in space with a clear sequence and fluidity. The architecture of a Maternal and Child Health Facility can facilitate women to understand and assess their current stage of labour and help health workers to better handle critical or unpredictable situations.

The design proposed in this thesis emphasizes the patient experience and offers solutions to create a space for healing rather than a machine for treating. The architecture of a labour ward, at a large scale, can be seen as an opportunity to ultimately reduce maternal and neonatal mortality, by focusing on creative problem solving, human centered design and quality of care that reevaluates and improves the user’s experience in the facility.

Having had the previous experience of visiting and analysing existing facilities in Zanzibar, Tanzania, it became very clear that the lack of basic architectural strategies was rapidly degenerating the current condition of the wards and hospitals. In Kitgum, Uganda, the situation was similar. Through identifying the intervention opportunity areas, each key moment of the journey in the facility was rethought with design principles addressed in this design proposal.

¹ Guenther, R. and Vittori, G. (2013). Sustainable healthcare architecture. 1st ed. Hoboken, N.J.: John Wiley & Sons, Inc., p.23.

² Lawson, B. (2010). Healing architecture. Arts & Health, 2(2), p.95.

01

a Labour Ward in
low-resource settings



Most people around the world will search for specialized medical care when faced with serious pain or injury but when it comes childbirth the response may be different due to the intervention of different factors like custom, religion, superstition or family pressure.

According to Cox and Groves, the general opinion on getting institutional care differs from nation to nation, but maternities have specific universal demands and they deal with a natural life-event, rather than a disease or accident. A Maternal and Child health facility handles the whole spectrum of monitoring, from pregnancy, to delivery to after-care and it is not meant to handle a cure, but rather accompany a biological process. Therefore, “not only are its accommodation requirements different from those of other wards but it is important that it should not be associated psychologically with illness”. (Cox, A., Groves, P., Design & Development Guides - Hospitals & Health-Care Facilities, London, 1990)

“Large general hospitals are immense, highly sophisticated institutions. Empirical studies have indicated excessively institutional environments in large medical centers are a cause of negative effects to occupants, including stress, anxiety, wayfinding difficulties and spatial disorientation, lack of cognitional control, and stress associated with inadequate access to nature. The rise of patient-centered and evidence-based movements in healthcare planning and design has resulted in a general rise in the quality of hospital physical environments.”³

³ Jiang, S. and Verderber, S. (2017). On the Planning and Design of Hospital Circulation Zones. HERD: Health Environments Research & Design Journal, 10(2).

According to the WHO (World Health Organization) Annual Report 2007, all health facilities should fulfill certain requirements, despite their location, size or budget⁴. These are as outlined below:

Efficiency and Cost-Effectiveness

According to World Health Design 2005 an efficient hospital layout should:

- 1) Promote staff efficiency by minimizing distance of necessary travel between frequently used spaces;
- 2) Allow easy visual supervision of patients by limited staff;
- 3) Include all needed spaces, but no redundant ones. This requires careful pre-design programming;
- 4) Provide an efficient logistics system, which might include elevators, pneumatic tubes, box conveyors, manual or automated carts, and gravity or pneumatic chutes, for the efficient handling of food and clean supplies and the removal of waste, recyclables, and soiled material;
- 5) Make efficient use of space by locating support spaces so that they may be shared by adjacent functional areas, and by making prudent use of multi-purpose spaces;
- 6) Consolidate outpatient functions for more efficient operation—on first floor, if possible—for direct access by out-

⁴ WHO Annual Report cited in Marfo, T. (2007). Designing to Heal: The Role of Architecture in Promoting Healing in the Long-term Care Setting, M Arch thesis, Kwame Nkrumah University, p.14-20.

patients;

7) Group or combine functional areas with similar system requirements;

8) Provide optimal functional adjacencies, such as locating the surgical intensive care unit adjacent to the operating suite. These adjacencies should be based on a detailed functional program, which describes the hospital's intended operations from the standpoint of patients, staff, and supplies.

Flexibility and Expandability

Since medical needs and modes of treatment will continue to change, hospitals should:

1) Follow modular concepts of space planning and layout;

2) Use generic room sizes and plans as much as possible, rather than highly specific ones;

3) Be served by modular, easily accessed, and easily modified mechanical and electrical systems;

4) Where size and program allow, be designed on a modular system basis. This system also uses walk-through interstitial space between occupied floors for mechanical, elec-

trical, and plumbing distribution. For large projects, this provides continuing adaptability to changing programs and needs, with no first-cost premium, if properly planned, designed, and bid. This Building System also allows vertical expansion without disruptions to floors below

5) Be open-ended, with well planned directions for future expansion; for instance positioning "soft spaces" such as administrative departments, adjacent to "hard spaces" such as clinical laboratories.

Therapeutic Environment

Hospital patients are often fearful and confused and these feelings may impede recovery. Every effort should be made to make the hospital stay as unthreatening, comfortable, and stress-free as possible. The interior designer plays a major role in this effort to create a therapeutic environment. A hospital's interior design should be based on a comprehensive understanding of the facility's mission and its patient profile. The characteristics of the patient profile will determine the degree to which the interior design should address aging, loss of visual acuity, other physical and mental disabilities, and abusiveness. (Interior Design Manual 2005.) Some important aspects of creating a therapeutic interior are:

- 1) Using familiar and culturally relevant materials wherever consistent with sanitation and other functional needs;
- 2) Using cheerful and varied colours and textures, keeping in mind that some colours are inappropriate and can interfere with provider assessments of patients' pallor and skin tones, disorient older or impaired patients, or agitate patients and staff, particularly some psychiatric patients;
- 3) Admitting ample natural light wherever feasible and using colour-corrected lighting in interior spaces which closely approximates natural daylight;
- 4) Providing views of the outdoors from every patient bed, and elsewhere wherever possible; photo murals of nature scenes are helpful where outdoor views are not available;
- 5) Designing a "wayfinding" process into every project. Patients, visitors, and staff all need to know where they are, what their destination is, and how to get there and return. A patient's sense of competence is encouraged by making spaces easy to find, identify, and use without asking for help. Building elements, colour, texture, and pattern should all give cues, as well as artwork and signage. (Signage Design Guide 2005)

Cleanliness and Sanitation

Hospitals must be easy to clean and maintain. This is facilitated by:

- 1) Appropriate, durable finishes for each functional space;
- 2) Careful detailing of such features as doorframes, casework, and finish transitions to avoid dirt-catching and hard-to-clean crevices and joints;
- 3) Adequate and appropriately located housekeeping spaces;
- 4) Special materials, finishes, and details for spaces which are to be kept sterile, such as integral cove base. The new antimicrobial surfaces might be considered for appropriate locations;
- 5) Incorporating practices that stress indoor environmental quality (IEQ).

Accessibility

All areas, both inside and out, should:

- 1) Comply with the minimum requirements of the Disability Act (DA2005) (Source: Ministry of Health Codes 2006);
- 2) Ensuring steps are flat enough to allow easy movement and sidewalks and corridors are wide enough for two wheelchairs to pass easily;
- 3) Ensuring entrance areas are designed to accommodate patients with slower adaptation rates to dark and light; marking glass walls and doors to make their presence obvious.

Controlled Circulation

A hospital is a complex system of interrelated functions requiring constant movement of people and goods. Much of this circulation should be controlled.

- 1) Outpatients visiting diagnostic and treatment areas should not travel through inpatient functional areas nor encounter severely ill inpatients;
- 2) Typical outpatient routes should be simple and clearly defined;

3) Visitors should have a simple and direct route to each patient nursing unit without penetrating other functional areas;

4) Separate patients and visitors from industrial/logistical areas or floors;

5) Outflow of trash, recyclables, and soiled materials should be separated from movement of food and clean supplies, and both should be separated from routes of patients and visitors;

6) Transfer of cadavers to and from the morgue should be out of the sight of patients and visitors;

7) Dedicated service elevators for deliveries, food and building maintenance services.

Aesthetics

Aesthetics is closely related to creating a therapeutic environment. It is important in enhancing the hospital's public image and is thus an important marketing tool. A better environment also contributes to better staff morale and patient care. Aesthetic considerations include:

- 1) Increased use of natural light, natural materials, and textures;

- 2) Use of artwork;
- 3) Attention to proportions, colour, scale, and detail;
- 4) Bright, open, generously scaled public spaces;
- 5) Homelike and intimate scale in patient rooms, day rooms, consultation rooms, and offices;
- 6) Compatibility of exterior design with its physical surroundings.

Security and Safety

In addition to the general safety concerns of all buildings, hospitals have several particular security concerns:

- 1) Protection of hospital property and assets, including drugs;
- 2) Protection of patients, including incapacitated patients, and staff
- 3) Safe control of violent or unstable patients;
- 4) Vulnerability to damage from terrorism because of proximity to high- vulnerability targets, or because they may be highly visible public buildings with an important role in the public health system.

The attributes stated above are, unfortunately, not present in all hospitals. They are largely present in developed countries' hospitals, and often its users take for granted some of these aspects without realizing.

In developing countries and challenging contexts, these guidelines are not fully followed, leaving unresolved many issues that are fairly easy to address, mainly due to lack of funds and resources. The building processes and improvement strategies are put in place when funding is available, which can be an irregular occasion, resulting in inefficient timing and coordination, or even impossibility to achieve the objective.

Is it not always possible to design and build a new labour ward mainly due to lack of available funding and resources. Approached as a prototypical design proposal, this thesis work focuses on a new design, but its principles and strategies are possible to be systematized in an existing facility in order to improve what is already built.

Designing a health facility in a low resource setting implies taking into account many of the existing challenges such as lack of constant electric power supply, severe hot climates with heavy rains, care for material integration and appropriateness and attention to cultural values. There are additional logistic difficulties that play a role in the design such as shortage of staff, which means having to provide flexible spaces that can be monitored by less

people. Overcrowding and patient growth prediction should also be considered in the design, in order to allow future pertinent extensions.

1.1 Key Moments and Opportunity Areas

There are five key moments that a mother goes through in a maternal and child health facility:

1. Arrival

The moment women arrive to the facility and how they feel welcomed by the medical staff and physical surroundings. A direct and emergency arrival can also occur. This is when women are assessed by a healthcare practitioner that sets priorities.

2. Admission

When women are triaged and have their data collected and are sent either to the active labour room or directly to the delivery room, if that is the case.

3. Labour

This is the moment prior to delivery, when women should stay active and walk around as much as possible. Medical staff need to provide constant monitoring.

4. Delivery

The peak of the journey, when women give birth, in privacy and with the support of the companion. It is equally im-

portant to stay active and be aware of the procedures and surroundings. It is again a moment of close monitoring, as emergency c-sections might occur.

5. Postpartum and discharge

While on postpartum, women need to rest in a calm atmosphere and have follow-up monitoring, as the risks are starting to decrease. It's an environment where mothers and newborn babies bond, alongside family members. Before discharge, there is a doctor's check-up and counseling.

Opportunity areas are seen as spaces, moments or routines that still need further improvement and development of new concepts. They are a center point of the final design proposal, that intends to care for an upgrade or refinement in these areas, that sometimes can be antithetical. The opportunity areas addressed in the design are:

Hygiene Routines

The presence of visible and accessible sinks throughout the facility is a strategy that works as a reminder or alert to handwashing, in order to minimize the risk of infection. Materiality choice on the inside of the building is also essential in creating spaces that are easy to clean, while still aesthetically pleasing.

Administration and maintenance

A large part of a well-functioning health facility is the way in which it is administrated and maintained. This includes



Fig. 1 - Model of the woman's journey developed in the Lab.Our Ward Project - a guide for orientation and spatial design

not only financial and logistic administration, but also the quality of the medical staff and how it is coordinated, the maintenance staff, like cleaners and janitors and the way all these parties are interrelated in order to create a harmonious, balanced and clean health facility.

Privacy in labour, delivery and postnatal

Currently in low-resource settings, even in private facilities, privacy is not yet seen as necessary. The wards are open, the delivery beds are sometimes separated by only curtains and the postnatal wards can be crowded, unventilated and noisy spaces. Therefore, part of the focus of this thesis is to propose solutions that give privacy throughout the journey, as well as create safer, calmer and sounder ward spaces.

Presence of a companion

Contrary to the majority of the facilities, the proposed design gives women the possibility to have a companion in all stages of the journey. Studies show that when women feel supported and cared for by someone familiar, the process of labour and delivery is faster, smoother and healthier.

Mobility in space

The presence of courtyards and wide spaces encourages women to move around and speed up their labour time, while remaining in contact with green spaces, natural light and fresh air.

Access to outdoor spaces

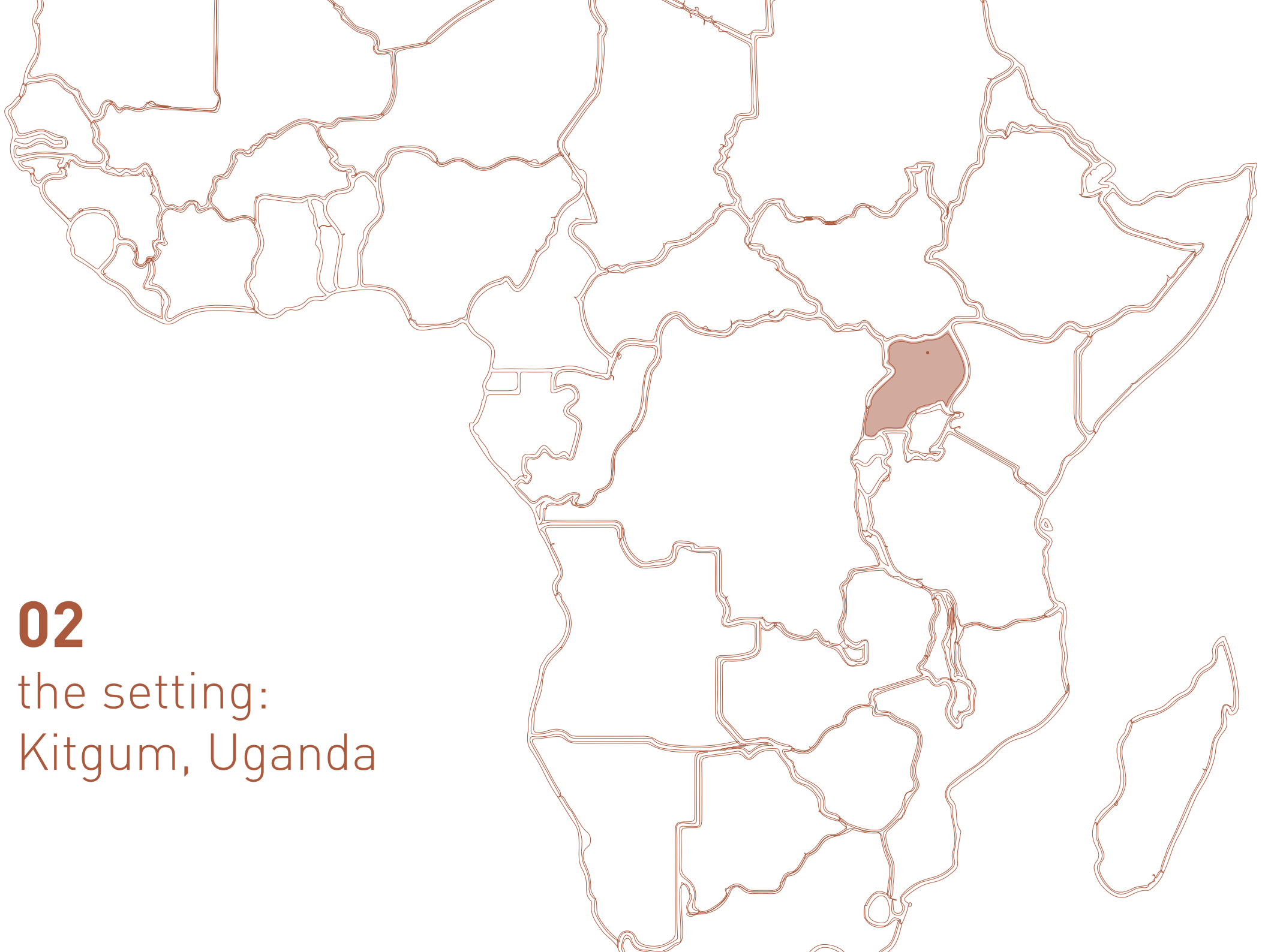
Both women and family members are able to use the outdoor spaces to wait and meet, instead of overcrowding the waiting areas. Not only the climatic conditions are appropriate to do so, but it is also a normal habit in hotter weathers.

In order to face the opportunity areas described above, there are some core design principles that are present in the building design and further explained in this thesis work, like circulation and flow, dichotomy between privacy and visibility, natural light, ventilation and adequate airflow, hygiene, shading and rainwater harvesting.

Prior to seeing and explaining how these design principles are reflected in the final building proposal, the next chapters give context to the work, analyze the current maternal and child health care practices in Uganda and study integration through materiality and tradition.

02

the setting:
Kitgum, Uganda



Background and ethnic culture

Uganda is situated in Eastern Africa, in the African Great Lakes Region, bordering with the Democratic Republic of the Congo, Kenya, Rwanda, South Sudan and Tanzania. The country is landlocked with no access to the sea, surrounded by mountains. The climate is tropical and generally rainy with two dry seasons - December to February and June to August.⁵

Kitgum town is the capital of Kitgum District, located in Chua County⁶ in Northern Uganda, close to the border with South Sudan. The entire district has about 200 000 inhabitants and approximately 60% of the population in under 19 years old⁷. Kitgum Town specifically has more than 62 000 inhabitants⁸ and it's one of the areas where the Acholi people come from.

The Acholi people are an ethnic group of northern Uganda that migrated from their homeland along the Nile River in Southern Sudan in the sixteenth century and settled in different parts of East Africa. The Acholi communities live in small settlements, where the houses are circular huts with a high peak, and inside they have a sleeping platform, storage for grains and a fireplace for cooking. Women are the ones responsible to daub the walls with mud, some-

times decorating them with geometrical or conventional patterns. Agriculture is also their task, growing and processing a variety of food crops, including millet, simsim (sesame seeds), groundnuts, peas, sorghum, vegetables, etc. It's still common nowadays for communities to keep goats, sheep and cattle, and these animals are a common sight around the town and the fields⁹.

All these facts and background information have been known to me since this journey started. It's unrealistic to state them in the same way after spending 1 month in Kitgum. The 62 000 people are dispersed around the fields and arid landscape, typical of that region. The distances are long, the transport scarce and the weather severe. Kitgum has a centre, which consists of 1 roundabout from which 4 or 5 paved roads stem from. There is a big market, a couple of banks and guesthouses and not much more. After crossing the small bridge everything scatters in the land and hut villages form more obviously and freely, always associated with agriculture and food crops. This type of context is where most of the people live their lives.

The Kitgum district and the Acholi people are still recovering from the 20-year civil war that struck Northern Uganda in the late 1980's.

5 Cia.gov. (2017). The World Factbook — Central Intelligence Agency. [online] Available at: <https://www.cia.gov/library/publications/the-world-factbook/geos/ug.html> [Accessed 3 Apr. 2017].

6 Sengendo, H. (2012). Kitgum urban profile. 1st ed. Nairobi: UN-Habitat, p.7.

7 Uganda Bureau of Statistics (2016). Uganda National Population and Housing Census 2014 – Subcounty Report – Northern Region, Kampala, Uganda, p.141.

8 Portal, F., Camp, K., Ssabagabo, M., Camp, N. and Camp, R. (2017). Uganda: Regions, Major Cities & Towns - Population Statistics in Maps and Charts.

[online] Citypopulation.de. Available at: <https://www.citypopulation.de/Uganda-Cities.html?cityid=12022> [Accessed 3 Apr. 2017].

9 Ceremony, A. (2017). Acholi People: the famous East African spiritually and martially powerful people with culturally unique mato oput justice and reconciliation rituals ceremony. [online] Kwekudee-tripdownmemorylane.blogspot.fi. Available at: <http://kwekudee-tripdownmemorylane.blogspot.fi/2013/06/acholi-people-famous-east-african.html> [Accessed 3 Apr. 2017].

Many people have died, others lost their entire families and had to constantly run away from the rebels, a group internationally known as the LRA – Lord’s Resistance Army. The LRA was strongly opposing the Ugandan Government, killing civilians, abducting children and turning them into child soldiers, porters and sex slaves, and mutilating the few that were spared.¹⁰

During the war, the government moved tens of thousands of people into Internally Displaced Persons camps. Water and food supply was insufficient, sanitation very poor and health and education provision kept minimal. This precautionary measure soon became the source of more insecurity, conflict and eventually disease.¹⁰

The crisis lasted for more than 20 years with occasional conflicts arising still today. However, Kitgum has been steadily recovering from the war and displaced people have returned to their homes, restoring their routines and day-to-day life. The returnee situation has, however, also presented sudden challenges in providing basic health and social services.¹¹

Nowadays, Kitgum Town is the main commercial hub of the whole district and it houses its headquarters. The town is facing the usual problems characteristic of urban development, such as overpopulation and unemployment, lack of basic urban services and poor waste management. Due to the town’s dilapidated condition and high population, it’s also prone to disasters like flooding, drought and fire

outbreaks, having a poor capacity to manage these disasters.

As mentioned before, the lack of waste management is very evident and causing challenging environmental and public health implications. The lack of waste management and collection causes a significant amount of pollution and waste dumping, especially in the centre of the town and around the markets, consequently affecting the water sources and sanitation. These facts not only affect the aesthetic perception of Kitgum, but also have a negative impact on the environmental and human health of the town.¹²



Fig. 2 and 3 - Market downtown; A street in the centre of Kitgum Town

10 Deng, F. (n.d.). Internally Displaced Persons in Uganda - a forgotten crisis. The Brookings-SAIS Project on Internal Displacement, FMR 19.

11 Reproductive Health in Northern Uganda. (2009). Women’s Refugee Commission.

12 Sengendo, H. (2012). Kitgum urban profile. 1st ed. Nairobi: UN-Habitat.

03

healthcare in
Northern Uganda



3.1 Needs and challenges

According to Kyomuhendo, Uganda's socio-economic and political instability are the main cause for a high maternal mortality and morbidity, marked by the "destruction of the health infrastructure, chronic shortages of both staff and material supplies, poor remuneration of health workers, low accessibility to health services and erosion of medical ethics"¹³

However, "today there is a favourable and enabling policy environment, including good policies on gender equity, universal primary education, reproductive health and decentralisation of health services". There policies include actions to be taken by the Ugandan Government and NGO's to build more health facilities, improve the quality of care, train more health workers and grow the number of equipment and supplies.¹³

The issue remains that there hasn't been a significant increase in the search for professional obstetric care by women nor an important reduction of deaths. The reason why the government policies are so poorly implemented is the "endemic lack of resources at all levels — i.e. lack of skilled attendants, emergency obstetric drugs and supplies, blood, anaesthesia or facilities able to offer emergency obstetric care".¹³

In Kitgum town there are currently 2 hospitals, 6 clinics and 57 pharmacies of different sizes mainly clustered within the town centre (Kitgum Urban Profile, UNHabitat). Kitgum Hospital is the district public hospital, which serves around 300 000 people and faces not only severe staff shortages and inadequate infrastructure but also lack of equipment and supplies for their patients¹⁴.

The other hospital is St. Joseph's Hospital, a private community hospital owned by the Gulu Catholic Archdiocese¹⁵, which also serves a large amount of people but is only accessible to those who can afford to pay their services, even if the fees are small. Both these health facilities have maternity services, each with their flaws and benefits.

Currently, the growth rate of the population in the district of Kitgum is 3.2 percent and women form the majority of the population¹⁶. In order to accommodate this population growth, there is a rising need for birthing facilities throughout the district.

Despite the notable population growth, the infant and maternal mortality remains high in Uganda, especially in the northern regions. This means that one in every 19 babies born does not live to the first birthday.

13 Kyomuhendo, G. (2003). Low Use of Rural Maternity Services in Uganda: Impact of Women's Status, Traditional Beliefs and Limited Resources. *Reproductive Health Matters*, 11(21), p.17.

14 www.newvision.co.ug. (2012). Kitgum Hospital: A facility falling apart. [online] Available at: http://www.newvision.co.ug/new_vision/news/1299148/kitgum-hospital-facility-falling-apart [Accessed 3 Apr. 2017].

15 Kitgum, W. (n.d.). Home - St. Joseph's Hospital Kitgum. [online] [Sjhkitgum.org](https://www.sjhkitgum.org). Available at: <https://www.sjhkitgum.org> [Accessed 3 Apr. 2017].

16 Sengendo, H. (2012). *Kitgum urban profile*. 1st ed. Nairobi: UN-Habitat.

Those who survive to the first birthday, 38 out of 1,000 would die before reaching their fifth birthday. This shows that one in 11 children dies before their fifth birthday¹⁶. As a comparison, in Finland the infant mortality rate is 2 deaths per 1000 live births. The maternal mortality rate in Uganda is still at a shocking 343 deaths per 100 000 live births, while in Finland it is 2 deaths per 100 000 live births¹⁷.

HIV/AIDS and teenage pregnancy continue to be an issue among the population mainly due to the lack of information about family planning, high levels of illiteracy – around 40 percent in Kitgum and 45 percent nationally – and in some cases ethnic traditions of polygamy and wife inheritance¹⁸.

The main causes of the issues stated above is poor and uneven access to education, high dropout rate and sometimes high school fees, which create a barrier for children whose families are unable to pay such expenses.

Further support and funding are needed to address these ongoing challenges in the health sector, especially the lack of trained and specialized health practitioners, drugs and medical equipment. Midwifery skills are particularly at a high necessity.

Another noticeable problematic is the lack of ambulances and appropriate transport for rural pregnant women to reach the birthing facilities on time.

There is an overall shortage of ambulances, and when they do exist, often there are no funds for fuel, vehicle maintenance and staff¹⁹.

Pregnant women that live in rural areas very often cannot reach a birthing facility, having to face a home birth, either alone, with a family member or a traditional birth attendant, becoming susceptible to infection risks both for her and the newborn. If complications arise and there is no mean of transport to reach a hospital, both the mother and the newborn can die.

On the other hand, when mothers can reach a hospital safely, they often encounter overcrowded wards and insufficient staff to handle everyone. These situations are, unfortunately, still very common hence the high mortality rates for both mothers and newborns.

There are, however, strong ethnic and cultural beliefs about motherhood and birth. The Acholi people believe that a strong woman is one who is able to deliver alone, at home. If she or the baby dies, it's seen as a sad but normal event in a woman's life. This is a very different notion of family building and what is considered normal or tragic in life. This is not only an Acholi belief, but an ideology spread in other African cultures as well, which reduces the chances of women seeking professional maternal care.



Fig. 4 - Overcrowded ward in the Kitgum Government Hospital

16 Uganda Bureau of Statistics (UBOS) and ICF International Inc. (2012). Uganda Demographic and Health Survey 2011. Kampala, Uganda: UBOS and Calverton, Maryland: ICF International Inc., p.98.
17 Indexmundi.com. (2016). Finland Infant mortality rate - Demographics.

[online] Available at: http://www.indexmundi.com/finland/infant_mortality_rate.html [Accessed 3 Apr. 2017].
18 Sengendo, H. (2012). Kitgum urban profile. 1st ed. Nairobi: UN-Habitat.
19 Reproductive Health in Northern Uganda. (2009). Women's Refugee Commission.

Women are afraid of being secluded and considered weak if they search for help during childbirth or express a desire of delivering in a health facility.

Rethinking the maternity and birthing experience and journey is challenging not only for the lack of resources, medical staff and health facilities but also because it defies wider societal and cultural beliefs that still lead to preventable unhappy outcomes. Although funds and support go a long way and can bring a rather fast relief, some time is needed in order to change customs and social behaviour of a given society. There is also a need to educate both men and women on the risks of home deliveries and motivate women to seek the help of a skilled professional.

3.2 Previous practice vs. current practice

Many women do not have the possibility to reach or afford a health center and they end up giving birth with the help of a TBA (Traditional Birth Attendant). TBAs use herbs and other homemade remedies in order to cure or alleviate pain. This has been the standard birthing method for centuries. Women are raised to believe that pregnancy is a normal event in life that doesn't require medical care, believing in spiritual solutions and witchcraft.²⁰

In an effort to reduce maternal mortality, the Ugandan Government has conducted programs to collaborate and train TBAs in order for them to successfully perform deliveries. However, they have later on concluded that the maternal mortality and morbidity did not decrease.²⁰

Despite the general strong belief in these traditional methods, women start to rely more on health facilities and understanding that the risks can reduce significantly when the delivery is done by a skilled professional. The number of facility deliveries is steadily increasing.

The role of the companion during childbirth is also seeing some change. Although it has been common in the past for women to be accompanied by a female family member, the husband or father has been taking a back seat and considered an extraneous member of the process. Nowadays, men are assuming a more important role. Not only some women start to desire their involvement but they themselves start to contradict the traditional stigma that men should not be part of it. However, this behaviour is still more predominant among people with higher education and there are still a lot of women that prefer to keep men out.

²⁰ Armstrong, A. (2011). The Impact of Traditions and Traditional Birth Attendants on Maternal Mortality: A Case Study of Nyakayojo sub-County, Mbarara District, Uganda. Undergraduate Honors Theses. University of Colorado Boulder.

04

fieldwork:

1 month in Uganda



4.1 Learning the culture

I decided to take as much time as possible to stay in Kitgum and allow myself to submerge in the culture and local habits. This was my way to better understand the people I am designing for. I feel this choice has given me the opportunity to collect, consider and apply the users' input and needs. I believe that involving users creates ownership, which empowers and generates pride. Having a connection to the new building and being part of the design process makes people care and further maintain the building and oversee its future.

I departed for 1 month on the 15th of november 2016. I had in my backpack the previous experience and research work I had done for the Zanzibar project, and this helped tremendously. My knowledge at that point was factual and conceptual, but the experience took place on another context, even if also an African one. On this new journey, I was determined to try to understand what it means in this specific cultural context to have a dignified healing place, how that space is inside, physically, and what feelings does it transmit to its users. The space should induce orientation, calmness, balance, trust. The users of the space span from the soon-to-be-mothers, to the medical staff, the companions and family members and the newborn babies. How these users interact with each other also molds spatial hierarchy, allowing for traditional customs to take place, rather than trying to change them.

People in Kitgum are especially welcoming and I felt that from the very beginning, amplified by the fact that I knew what this community has and is facing. Generosity, gratitude and friendliness are traits of these people that will share with you the little that they have.

In Uganda about 84.5 per cent of the population is catholic or practices one of several Christian denominations²¹. The second biggest religion is Islamism. Religion is very present in people's everyday lives and Kitgum is no exception. Being there, one can feel religious beliefs being expressed regularly by the people and being extended to you, the visitor.

I had the opportunity to visit the traditional huts in a settlement outside Kitgum. The majority of the people reside in huts in a family cluster. The huts are almost always round because that is the shape that is used in the North of Uganda. In other areas they might be squared or rectangular and built with slightly different materials and techniques. In Kitgum, the huts are built with clay bricks and plastered with mud and/or cow dung and have a thatched roof. There is usually a row of wooden columns around the hut which support the roof structure, that can be made of bamboo or eucalyptus branches. The walls of the hut have to be plastered with mud every year before dry season and women are the ones responsible for this job.

21 WorldAtlas. (2017). Religious Beliefs In Uganda. [online] Available at: <http://www.worldatlas.com/articles/religious-beliefs-in-uganda.html> [Accessed 3 Apr. 2017].

On the inside, depending on the function of the hut, there is usually a space to sleep, a small storage area and a small table to sit around, either on the floor or in small stools. If the hut is the 'kitchen' there is a fire to cook, some stones to grind seeds into flour and storage space. The huts don't have any electricity or plumbing.

A local explained that the settlements are composed according to the family size. There is often one hut for the elderly man, one for the mother and daughter(s), one for the boys and an additional one working as a kitchen. The settlement can grow and change based on the family's alterations. Almost everyone has a garden and small vegetable plantations around the huts. People take a lot of pride in caring for their home and often sweep the floor even if it's a dirt floor and keep the garden maintained and vibrant.

4.2 Research Methodology: understanding the reality and current practices

In order to collect all the material necessary to work with when back in Helsinki, I planned where and how I would get that information. There are many members and users involved in a birthing facility: the mothers, the health care providers, the companions and family members, the management and cleaning staff, trainees, etc. It was important for me to hear from every perspective.

Through visits, interviews, informal talks and activity

workshops I tried to collect thoughts and insights from all involved parties, not only on the labour ward space flow and organization but also on local materials and traditional techniques.

4.2.1 Construction site visits

Upon arrival in Kampala, I visited a construction site with a local construction company engineer. It was a rather big building, soon to be a university building, so in this particular case concrete was used for the frame of the building due to its size and height, and the walls were being filled with local clay bricks and mortar and plastered afterwards.

It was not a traditional building method, but it seems to be a common one in the capital, where western materials like concrete and metal sheets often have a better reputation and represent progression. In Kitgum, through informal talks with people and construction workers I had another perspective on traditional materials and techniques, and in fact clay bricks, mud walls and different types of plaster are the most typical construction type.

4.2.2 Facility visits: local references

Knowing how local birthing facilities work gave me an important knowledge of the local standards and what can



Fig. 5 and 6 - Lagoro Maternity bed; Entrance and reception of the Kitgum Government Hospital

be done in order to improve the spaces and consequently the birthing experience. I visited a small rural birthing facility and the two hospitals in town, which gave me a wide perception in terms of scale and users. In all of the visits I had a guided tour by the midwife in charge.

The rural facility was located in Lagoro, a very small town southeast of Kitgum. The facility has 30 to 70 births per month and only three midwives and one nurse. Despite the conditions and lack of equipment and staff, the facility has a good reputation among the population due to its skilful and friendly staff. This indicates that the quality of the health workers can be more important than the quantity.

The spaces were poorly organized and disproportional. There was only one delivery room, which can be a struggle in high season, and the staff spaces were almost inexistent.

The second labour ward visited was the private catholic hospital St. Joseph's. The hospital is a not-for-profit community hospital owned by the Roman Catholic Archdiocese of Gulu and it's a 350-bed hospital built in the 60's. The maternity ward welcomes 150 to 200 babies per month which makes it a medium sized labour ward. Women need to pay a small fee to deliver there, so the conditions are a bit better than average, but only for the privileged. The hospital is struggling with lack of resources and material so women have to buy the supplies needed for the birth such as plastic sheets plastic gloves, scissors, etc. Because

most families can't afford it, the hospital is not working in its full capacity.

The spaces are not logically connected and it is not easy to find your way around. The hospital functions are spread in detached volumes, which can be an advantage in this climate and setting, but it has the downside of not being so effective in emergency situations - for instance a fast connection between delivery rooms and operating theater in case of an emergency cesarean section.

The third and last maternity ward visited was in the Kitgum Government Hospital, which has between 200 and 250 births per month plus a 16-bed gynecology ward. It is free for women to give birth here, but they still have to pay for their own supplies, if the hospital does not have any donated ones. The ward has around 350 square meters so it is extremely tight and overcrowded. The building layout is rather simple with wards to each side of a central reception, but again it seems that additional spaces have been plugged without any logical connection and the operating theater is also detached. In this hospital it is common that the wards get so busy that some women have to bring their own thin mattresses and sleep on the floor. As I walked through the spaces and the wards the lack of ventilation and air renovation was very evident and some of the spaces lacked natural light.

In all the facilities visited there weren't any private delivery rooms. Women deliver in the same room, sometimes



Fig. 7 and 8 - Outside corridors at Kitgum Government Hospital; dark and small labour room at Kitgum Government Hospital

separated by only a curtain. In high season, in case all the delivery beds are occupied, often midwives have to deliver babies in the labour room (first stage room). The wards lack any privacy strategies and all the beds face the central corridor, making it a staff-oriented layout.

The visits were one of the best research methods because they show real situations in real time. It also helped to understand how the medical staff deals with overcrowding and what is considered ‘normal’ and ‘abnormal’ in this context.

4.2.3 Interviews with health care providers and women

Another method used to gain insights was interviewing both mothers and soon-to-be mothers and medical staff. The goal was to better understand the delivery experience both from women’s perspective but also from the health care provider’s perspective.

The interviews with the mothers were mainly focused on pointing advantages and disadvantages between different facilities, what are the priorities at the moment of delivery, what would they change if they had to repeat the experience and what type of space it should be and what feelings should it transmit.

When interviewing the medical staff, I investigated what are the most important aspects to take into account when delivering a baby, which areas or spaces need more atten-

tion, what are the specifications for each room or space and how the overall atmosphere and character of the building should be.

4.2.4 Workshop with mothers

To deepen my knowledge and get a more specific view from the women’s perspective on the future labour ward, I did a small workshop with three mothers from Kitgum, one of them was a midwife in the Lagoro rural facility. With the help of some illustrations, they told me their birthing stories in more detail, which brought up topics that are related to space such as lack of privacy and space orientation. At the end we drew up together an advertisement poster as if the new maternity would be built, with the purpose of isolating and identifying the core values and advantages of the new labour ward.



4.2.5 Workshop with the Yotkom health workers

I held a full day workshop session with the staff of Yotkom clinic where we did some activities that would help engage the staff in the ideation of the maternity to ensure ownership, relevance and usefulness. Fifteen health workers holding different positions at Yotkom participated in the session: doctors, nurses, administrative staff, midwives and laboratory technicians.



Fig. 9 and 10 - Workshop and interviews with mothers

The workshop went well and everyone was interested and participative, sharing their points of view and discussing ideas. I assumed a background position, meaning that my only task was to facilitate, communicate the activities and organize the groups and material, but I did not want to influence, interfere or give suggestions in any exercise. Therefore, all the results and ideas would be coming exclusively from the participants.

Description of activities

Activity 1: Warm up

In the days prior to the workshop, the participants were asked to bring along an object that is important in their daily work. After introducing themselves, the participants would explain why that object is essential. This way, everyone would learn something more than just their name and profession.

Activity 2: Experience mapping

The participants were divided into two groups. One group would focus on the woman's experience, the other on the health worker's experience. Each group mapped, on each stage of the journey, what the users (women and health

workers) want, feel, hear and see. The goal of this exercise is to put oneself in the shoes of the users on both ends of the spectrum and express feelings, needs and emotions that influence space and experience.

Activity 3: Envisioning a labour ward

Maintaining the same group structure, the participants ideated and 'built' the ideal labour ward. Using simple materials such as post-its, markers and wooden sticks, both groups designed a floorplan of a new maternity ward, using their own principles and organizational ideas.

Activity 4: Sharing the vision

After completing the floorplan design, each group shared what they had done and explained their decisions and process. The other group would give comments and feedback focused on key topics such as privacy, hygiene, safety and flow.

Activity 5: Spaces and materials

Among an image collection of existing spaces and buildings, the teams chose the ones they preferred and clustered them into different themes, such as ventilation, light, green spaces and materiality.

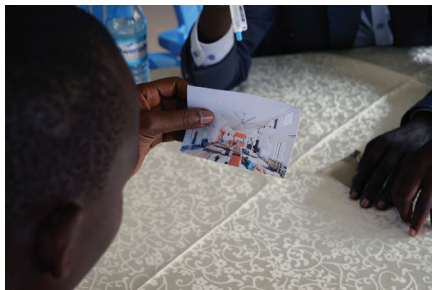


Fig. 11 and 12 - Full day workshop with the Yotkom staff

Activity 6: Drawing a poster

The last activity of the day was drawing a poster that could be the advertisement for a new labour ward in Kitgum. The goal of this exercise is to summarise the concept of the new maternity into a symbolic name, a drawn illustration or logo and three core values of the facility.

All the interviews, talks, workshops and activities conducted have helped in my process, especially in the beginning. Involving the locals and taking on a participative design attitude is something I had never done before. The first time I did it was with the Lab.Our Ward project in Zanzibar, and I experienced first hand what it is like to have a closer relationship with the end users of the building. I am aware that it is a method which is being increasingly used by architects and designers, though it still doesn't have a strong presence in the academic world.

The activities done in Kitgum have given me a clearer notion of the needs and priorities in this particular setting, as well as what is considered relevant in this social context. A television, for instance, seems to be a valuable asset in any facility or household, when it appears to be irrelevant in the birthing experience of a mother. Another subject that arose frequently is the quality of the staff and how they interact with mothers and family members. Despite the sympathetic attitude of the staff not being directly related with the architecture of the building, the latter could have

a positive influence in the relationship between the users and the staff members.

The interviews, workshops and the local experience have forced me to put myself in the user's shoes and consider strongly the cultural habits and values and respect them, rooting the architecture to the place.

I also believe that involving the end users from the initial stages sets a higher chance for success, relying on real needs and real ideas, rather than assumptions and theories.

The participative work conducted in Kitgum not only allowed me to meet and create a relationship with the people that would be using the building, but also working together on a shared vision - giving the families of Kitgum a dignified, safe and comfortable place to give birth in.

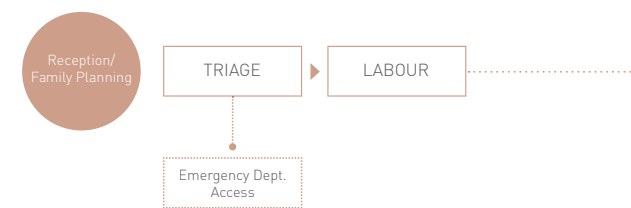


Fig. 13 and 14 - Full day workshop with the Yotkom staff

05

from circulation
to materiality





“Circulation: movement through space”²²
Francis DK Ching in *Architecture: Form, Space & Order*

.....

In architecture, the concept of circulation refers to the way people move in space. More specifically, the pathways people take through and between spaces, either inside a building or in urban spaces. Circulation is often thought as interstitial spaces, or “space between spaces”, which is never static but always variable. There is the common circulation and the emergency circulation, the latter being very important in a health facility. Logically, the circulation spaces should be clear and unobstructed and have the shortest distance possible between the connected spaces. The users want to move through the space easily, without having the feeling of being lost.

There are punctual moments where, for architectural reasons, circulation can be interrupted or broken. These moments are created to alert space changes through a height difference, or to slow down the user in order to create an observational or enjoyable moment.

Circulation is closely linked with programmatic use. At the same time, not all spaces need to be connected by the shortest distance possible. It can also be ‘choreographed’ meaning that the design driver can be, for instance, sequence of spaces, thresholds or atmospheres.

5.1 Circulation strategy in health facility design: creating the journey in the Maternal and Child Health Facility

There are certain characteristics or requirements that circulation spaces need to have according to their function and position. In a health facility, circulation is the most important spatial concept, and the starting point of the design, due to its many specifications and rules.

Young further explains that the corridor “sets crucial parameters for wayfinding” and states that stress levels drop when the wayfinding is efficient and the architecture appropriate. Corridor design can sometimes be neglected but it is important that it is treated with the same importance, transmitting the idea that healing is also in the connections.

“In health facilities the corridor should be the glue - the spatial entity that unites the building. The corridor is the public realm, the place of connection, where the public, staff, visitors and ambulatory patients meet.”²³

Inside any health facility, despite the department or unit, circulation is the pivotal point in the design process. Regardless of what department it is, more often than not the patients that arrive to the facility have different stories, backgrounds and procedures to go under. The medical staff adjusts their actions according to the specific care and treatment that the patient needs.

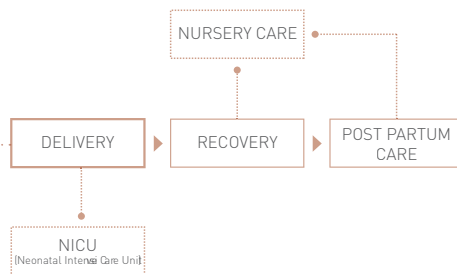


Fig. 15 - Flow diagram and circulation within obstetrics area (Kobus, R., Skaggs, R., 2008)

22 Ching, F. (2007). *Architecture - Form, Space and Order*. 3rd ed. Hoboken, N.J.: John Wiley & Sons.

23 Young, J. (1996). The Role of Architecture in Promoting Healing Environments in the Design of Small, Rural Hospitals. In: 84TH ACSA Annual Meeting - Open Sessions. p. 569.

In the case of a maternal and child health facility, there is, generally, a narrative associated with it, meaning that there are steps to be followed when mothers arrive to give birth. These steps have a specific order that is intended to generate a logical journey through the facility, but they are often not successfully translated into reality.

In a maternity department, the mothers are not patients, but clients. There are complicated and exceptional cases, but generally, the journey is very similar and progresses gradually, in a fairly predictable way. This has been the logic adopted to create a circulation system that would allow users to move easily between spaces. A circulation system that is intrinsically attached with the journey of the user through space.

Using this principle in the building design meant connecting the spaces not necessarily in the most rational way, but in a way that spaces help the user understand in which stage of the journey they're in. The room layout is composed according to the sequence of action in the birthing journey, where the corridors connecting the sequential moments are placed in the center of the building, lighted by an accessible interior courtyard.

5.2 Integration through materiality: natural, local, sustainable

In a study about African Traditional Architecture, Andersen affirms that when designers work for unfamiliar contexts, it is crucial that they are “equipped with a complete survey of the traditional built environment of the area in question” because this allows for a better comprehension of the existing intricate interrelationships between man, activity and environment. The study of these relationships and of climate and physical environment shows that still many rural areas which are untouched by industrialization “reveal an integrated and skilfull use” of local natural materials, resulting in buildings that perform well and provide an adequate environment for its programme use.²⁴

There is a growing use of industrialized materials in some rural East African settings, however these materials are not used or handled with the same skillfulness that is so evident in the traditional use of organic, renewable materials.

Some of these materials, like clay, wood, wattle and daub, mud, animal manure, thatch, banana leaves, have been losing their dignity and appreciation over time due to the increasing emergence of industrialized materials such as iron and steel, concrete, prefabricated windows and doors, etc. A recognition of the benefits and advantages of the traditional environment is needed, not to create a nostalgic regression or under-development, but to preserve the current skills and knowledge for the generations to come.



Fig. 16 - Signage at the Kitum Government Hospital

²⁴ Andersen, K. (1978). African traditional architecture. 1st ed. Nairobi [u.a.]: Oxford Univ. Pr. p.2.

This way, the future built environment could keep up with the forthcoming lifestyle changes, and remain sustainable and ecological, avoiding wasteful and unsuitable use of modern materials.

A combination between local materials and more durable modern materials and techniques is also being adopted in newer buildings, which is an advantageous compromise, that embraces both durability and lower maintenance allied with integration and material suitability.

The materiality approach has been an important factor in the design process, due to the influence that the choice can have on the local environment. The aim is that the building is united with the local materiality culture, standing out not for its unfitted surfaces, textures or shapes, but for what it symbolizes. In order to reduce significantly the use of concrete, the main material of the building is load bearing clay bricks (Interlocking Stabilized Soil Blocks), in an innovative variation, further detailed in the following chapters. The materiality choice is responsive to the realities of architectural production and celebrates the crudeness of the fabrication process by highlighting the irregularity and texture of the finished product.

5.2.1 The use of clay bricks in East Africa

Nowadays, earth as a material for construction has been losing importance. Concrete and iron sheets are becoming

symbols of progress even in the most rural areas in the world. The new ‘global’ aesthetics are taking the stage, leaving traditional construction in the background. This is not only environmentally unsound, but it generates architecture which is “unresponsive to the climatological and cultural context”²⁵.

People are losing the skills and knowledge to build with earth, and relying more on wood, for instance. However, wood is progressively harder to get. Earth buildings also require maintenance, especially due to the erosion of the rainy seasons, and some people do not want to bear that task. These are some of the reasons why Earth Architecture is fading.²⁶

Earth construction has been adapted according to different countries, cultures and climatic contexts. There are several techniques that have been in use, both in brick format or in larger moulds in which earth is compacted in. Focusing on the brick format, there are two main types:

Compressed Earth Blocks (CEB) are made by mixing soil with a stabilizing agent, then pressed either manually or with a motorised press machine.²⁶ The compressed earth block is the evolution of the moulded earth block, often called adobe block²⁷.

Adobe Blocks resemble CEB’s but are made of a compacted mixture of clay and straw, and are less regular in size and shape than CEB’s²⁶. Adobe is strong when dry, but



Fig. 17 and 18 - Clay bricks burned and cooked (the fire is done in the center of the pile); Traditional clay bricks ready to be laid

25 Pérez-Peña, A. (2009). Interlocking stabilised soil blocks. 1st ed. Nairobi: UN HABITAT, p.2.

26 Pérez-Peña, A. (2009). Interlocking stabilised soil blocks. 1st ed. Nairobi: UN HABITAT.

weakens when unprotected from moisture. Cement and lime are some of the most common additives to the natural adobe mix to prevent moisture damage.²⁸

The concept of tightly packing earth to create blocks for construction is a method that has been in use for thousands of years. Although wooden moulds are still used in some parts of the world, the development of press machines has been a crucial step in the improvement of the technique.

5.2.2 The building technology: Interlocking Stabilized Soil Blocks

The creation of the CINVA-RAM press in the 50's by the Chilean engineer Raul Ramirez for the Inter-American Housing Center in Bogota, Colombia (CINVA) was an enormous progress of this technology. Thanks to this evolution, the production of earth blocks has evolved drastically.

Today there are many sorts of motor-driven and manual presses. The CINVA-RAM machines turned out to be more cost-effective, faster and environmentally-friendly, but there were still some drawbacks: masonry skills were still needed to lay the blocks, and a big amount of mortar was still needed. Therefore, the Human Settlements Division of the Asian Institute of Technology (HSD-AIT)

along with the Thailand Institute of Scientific and Technological Research (TISTR) together created the first interlocking soil blocks by modifying the CINVA-RAM press machine in the early 80's. This revised press machine is able to produce blocks that interlock when laid, which not only decreases significantly the use of mortar, but requires less skills to lay the bricks. The walls have an improved structural stability and cost less.²⁶

The Interlocking Stabilised Soil Block (ISSB) technology is becoming more popular and noted, especially in East Africa. Compared with other types of bricks, ISSB's present many benefits: they're affordable, versatile, environmentally friendly (there's no need to consume wood to fire them), easy to lay, and perform well. However, the end quality of the bricks depend on the soil and good production and implementation practices.²⁶

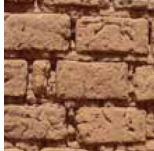


Fig. 19 - The evolution of block making

27 Rigassi, V. (1985). Compressed Earth Blocks: Manual of Production. Deutsches Zentrum für Entwicklungstechnologien - GATE, Volume I. Manual of production.

28 Chen, G. (2009). Analysis of Stabilised Adobe in Rural East Africa. Master's Degree of Science in Architecture. Faculty of California Polytechnic State University.

The following comparative study allows for a closer analysis of different types of bricks ²⁹:

PROPERTIES	Interlocking Stabilised Soil Block	Sun-dried Mud Block	Burned Clay Brick	Stabilized Soil Block	Concrete Masonry Unit
General Info					
Block Appearance					
Wall Appearance (not plastered)					
Dimension (cm) (L x W x H)	26.5 x 14 x 10	25 x 15 x 7 to 40 x 20 x 15	20 x 10 x 10	29 x 14 x 11.5	40 x 20 x 20
Weight (kg)	8-10	5 - 18	4 - 5	8 - 10	12 - 14
Texture	Smooth, flat	Rough, powdery	Rough, powdery	Smooth, flat	Coarse, flat
Blocks per sqm	35	10 to 30	30	21	10
PERFORMANCE					
Wet Compressive Strength (mps)	1-4	0 - 5	0.5 - 6	1 - 4	0.7 - 5
Thermal Insulation (W/m C)	0.8 - 1.4	0.4 - 0.8	0.7 - 1.3	0.8 - 1.4	1 - 1.7
Density (Kg/m3)	1700 - 2200	1200 - 1700	1400 - 2400	1700 - 2200	1700 - 2200
AVG. PRICE (2009)					
Per block (UgS)	350	50	150	400	3000
Per sq meter	35 000	10 000	55 000	45 000	75 000

²⁹ Pérez-Peña, A. (2009). Interlocking stabilised soil blocks. 1st ed. Nairobi: UN HABITAT. p.10.

In order to reduce the use of concrete, this technology has been adopted as the main construction material, which respects the use of traditional materials but with an innovative technique that increases the building's stability and durability.

When choosing to build with ISSB, the use of concrete is limited to the building's foundations, floor slab and lintels. There are several types of press machines that produce different bricks with distinct purposes ³⁰:

Straight Double Interlocking Block: The most commonly used block for wall creation.

Wide Format Interlocking Block: allows for stronger, thicker walls, especially useful when making high walls.

Curved Double Interlocking Block: Used for making water tanks and sanitation facilities.

Straight Single Interlocking Block: contains a larger face, hence less blocks are needed to cover wall area. This was the predecessor to the straight double interlocking block.

Grooved Double Interlocking Block: the grooves of this block facilitate plastering, however, this machine is no longer produced.

The Wide Format Interlocking Block was the variety chosen for the walls, as it is loadbearing. Its wider dimensions create a deeper and stronger wall that allows for bigger spans. The interior walls, however, are done with the slimmer Straight Double Interlocking Block.

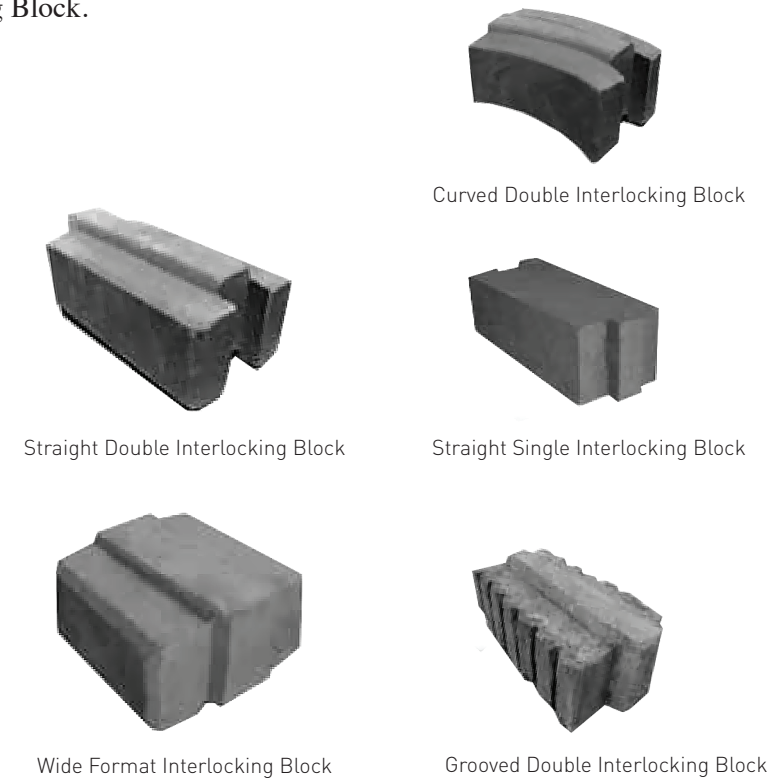


Fig. 20 - The different types of blocks produced by press machines

30 Pérez-Peña, A. (2009). Interlocking stabilised soil blocks. 1st ed. Nairobi: UN HABITAT, p.6.

06

conclusions



Contextualize // Educate // Promote

In the first part of this thesis, we have looked deeper into the requirements, restrictions and challenges of a Maternal and Child Health Facility in low-resource settings. The materiality and contextualization of the design have also been further deepened as an absolute vital part of a project in such contexts. With the continuous population growth that East Africa is witnessing, it may be that current practices and standards are not anymore suit to accommodate this change.

The mission to reduce infant and maternal mortality is a very complex and extensive one. This research focuses on identifying the main constraints and challenges and proposing more sustainable, achievable and sounder solutions that can bring significant improvement without large costs attached. Through learning from readings, personal experience in visiting some of the existing facilities and talking to people involved in the field, it has become more evident that an important obstacle to overcome is lack of funding. Most of the entities involved in infant and maternal health care are struggling with lack of resources and funds, which consequently restrains possible interventions, whether they are architectural, medical or administrative.

Learning from previous experience and the process of this thesis work, I can conclude that promoting and communicating some of the practices studied in this project can be an efficient way to upgrade and better the birthing experi-

ence in low-resource settings. Both new constructions and existing ones can benefit from simple principles, that don't necessarily bring about extra costs. Such basic principles like natural ventilation and natural light are still missing in many health facilities, even though they are rather simple aspects to resolve.

Some of the practices developed in this work to be recognized as central in order to promote a healthier birthing experience are:

Assuring natural and effective cross ventilation

As Escombe states “transmission of airborne infections is an important public health problem, especially in resource-limited settings” where technological measures like negative-pressure isolation rooms are hard to execute. Therefore, natural cross ventilation and air renovation may provide a cost-efficient alternative.³¹

Maximizing natural light and minimizing reliance on electrical power

The amount of openings in the rooms can not only aid in ventilation but also in bringing natural light into the space. Since power cuts are common, it is not safe to rely on electricity for light and ventilation during the day. The orientation of the spaces also dictate the type and amount of light coming in.

31 Escombe, A., Oeser, C., Gilman, R., Navincopa, M., Ticona, E., Pan, W., Martínez, C., Chacaltana, J., Rodríguez, R., Moore, D., Friedland, J. and Evans, C. (2007). Natural Ventilation for the Prevention of Air-

borne Contagion. PLoS Medicine, 4(2), p.e68.

Companion flow

According to WHO the presence of a companion is given as a standard of care: “birth companions provide physical, emotional and spiritual support to women during labour and deliver and thus have a positive impact on the women and improved birth outcomes”³².

Some facilities are not meant to accommodate a companion due to the lack of space, and the medical staff may become uneasy with their presence. In this sense, it is important to bring light into this topic and include it both in the architectural planning as well as in the service and care provision.

Clear circulation paths

By visiting the existing facilities in Kitgum, Uganda and talking to women who have had facility births, I learned that the orientation in the labour wards is often confusing, which can lead to increased anxiety and feeling of misplacement. Hence, circulation is another crucial point of action that can make the user feel like the building is prepared to receive them.

Access to green

As Ulrich suggests, green spaces in health facilities are “effective and beneficial settings with respect to fostering restoration for stressed patients, family members and staff”. In the presented building design, the interior central courtyard not only aids in natural ventilation and light, but also provides a green space for mothers and companions

to enjoy.³³

Hygiene routines

As Pittet explains, cross-infection in hospitals is largely caused by lack of hand hygiene and often the medical staff fails to comply to hand-hygiene rules. It is not only essential to amplify that lack of hand-washing is a health threat, but also provide “easy, timely access” to hand hygiene. A proposal to address this matter is increasing the number of sinks in the facility and placing them in strategic places, for instance in the entrances of the spaces.³⁴

User-oriented spatial logic

In many labour wards and health facilities in general, the space layout is done in a way that benefits and simplifies the work of the medical staff, at times not considering the privacy or comfort of the user. An example of this is the way that beds in wards are almost always placed against the walls with a central corridor. In this type of layout, the patients face each other, and might miss a moment of privacy. If the beds are placed head to head with the corridors in the perimeter, the patient can choose to be slightly secluded or to interact with other patients on their sides.

The vision of this design proposal is not only to fulfill the principles stated above but also to assist and cope with future horizontal extensions that the facility might see. In order to satisfy this, the design must be done in a way that the functions predicted to need extension are placed conveniently where the plot allows growth. This would ensure

32 Standards for improving quality of maternal and newborn care in health facilities. (2016). 1st ed. Geneva, Switzerland: WHO Library Cataloguing-in-Publication Data, p.51.

33 Ulrich, R. (2002). Health Benefits of Gardens in Hospitals. In: Plants for People International Exhibition Floriade.

34 Pittet, D. (2001). Improving Adherence to Hand Hygiene Practice: A Multi-disciplinary Approach. *Emerging Infectious Diseases*, 7(2), p.234.

cohesion when the building grows and avoid scattered similar functions that confuse the user's wayfinding.

What has been different in this project than any other I have done is the fact that I have been working with real people and with a real task. That not only involves demands and needs that cannot be forgotten, but also unexpected issues that arise during the process. Conceptually, implementing the design principles has not been particularly challenging, giving that they are thought to be easily adapted when designing in a low-resource setting. Practically, when deciding the room program and spaces needed for instance, it was hard to have a fixed list of rooms. It seemed that the more the process evolves the more spaces are needed, which not only increases the building's size but also the cost. Luckily, compromises have always been found.

I have also learned that in projects like these, there can be some conflict of interests due to matters such as building costs and ease of construction. It is not easy for everyone to see and understand the advantages of building with local and natural materials, instead of the industrial, uncontextualized ones. Many buildings in these kind of climates and settings are built in concrete with minimized use of windows and maximum puzzling of rooms, in order to

reduce building costs. The problems that arise afterwards may have consequences that are harder to deal with than if they are considered from the get go.

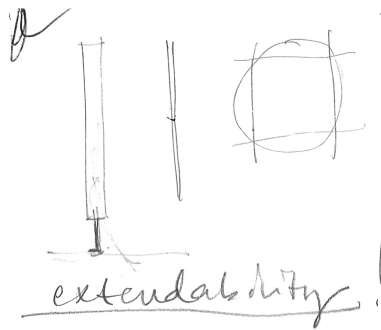
Unfortunately, the realisation of the building will not go forward anymore because the funder decided to take full ownership of the project - both design and construction - without collaborating with an architect.

Regarding the participatory work, some difficulties arose when trying to stick to the interviews and workshop plans that were previously made during the research phase. At times, interviews became informal talks in which a lot of information was still valuable, even though the original plan was not thoroughly followed. When conducting the workshops for instance, one can not assume that everything will be understood and that can affect the results. The way I found to deal with it is improvising when I thought it was not going as predicted, so that I could achieve the same results but with different methods.

Given the research and principles explained throughout, the next part of this thesis will propose a design that satisfies these practices.

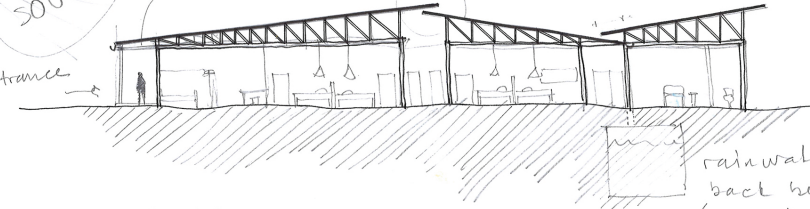
07

design proposal

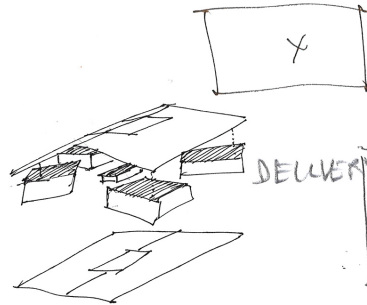


SOUTH
entrance
separate structure?
from roof

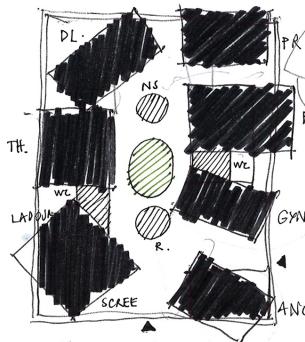
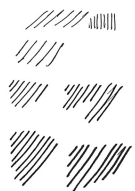
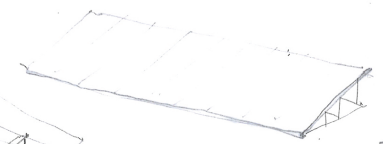
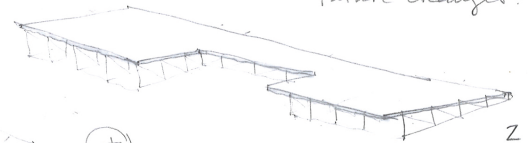
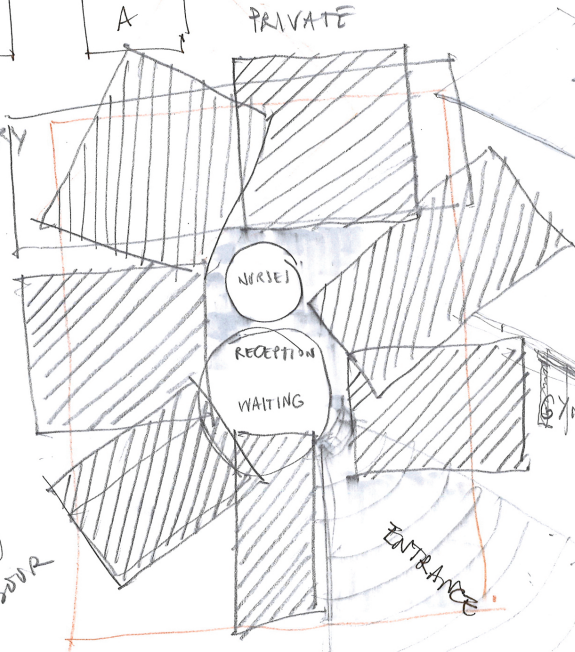
no gutter here because blocks are not
same height - gutter sticking out



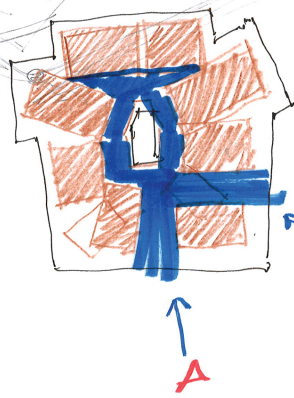
rainwater harvesting
back building
(doesn't compromise
future changes)



metal trusses instead
of wood. more freedom
FREE INDEPENDENT ROOF
SCATTERED BLOCKS. THEATER



MAIN
7 BLOCKS + WC + STERILIZATION + NURSES' STATION + RECEPTION



DESCRIPTIVE MEMORY

.....

The following text is intended to describe the building designed, its organization and functions inside, as well as its materiality and site.

The building designed is a labour ward, part of an existing Medical Center - Yotkom - located in Kitgum, Northern Uganda. A labour ward is another way of referring to a Maternal and Child Health Facility. The use of the word ward implies that it is a part of a bigger institution or hospital. The facility is designed for 100 births per month, with possibility to be extended according to needs.

The site of the building is located next to the main road which leads to the town's center. This creates some noise in the buildings close to it, due to the amount of buses and trucks passing by. The plot which belongs to Yotkom faces both the main street and a secondary street in the back. The existing Yotkom building, which has around 400 sqm, is facing the main street.

When starting to design at a larger scale and analysing the placement of the existing buildings and the features of the plot, I realized that the back of the plot would be much more silent to place the labour ward and it would still be able to accommodate entrances from both streets. Since there were other functions on the brief - such as administrative functions and additional children and men's ward - it made sense that this building would be placed in between the labour ward and the existing Yotkom building, as a sort of connector and noise barrier. The right side of the plot has been deliberately left "unoccupied", to be able to

either extend the labour ward or build other functions. I say "unoccupied" because there are only impermanent functions, such as a latrine and a traditional hut meant to become a small waiting home, for pregnant mothers than come from far away and await childbirth. This way, they can still benefit from the care and monitoring of the medical staff and be close to the facility when the time comes. These temporary functions can be easily moved or incorporated into new constructions, when they are to be made.

The administrative building is L-shaped in order to create a courtyard in front of the labour ward. This courtyard is intended to be a meeting point, an outside waiting area and a bond between both entities. In outside areas such as the courtyards, trees are extremely important for shading and all existing trees (although still small) are to be kept or transplanted.

The organization and layout of the spaces was achieved through a circulation-driven logic. In health facilities the circulation is the most important design aspect. Inside the labour ward, the spaces follow the journey and the key moments, almost like an open loop, to orientate its users and avoid feeling lost or disoriented - which is a common feeling in a hospital. The possibility to have a companion along the journey also dictates certain aspects of the facility, regarding privacy and circulation.

Regarding the labour ward, the first step of the journey is arriving and heading towards the reception. There is also a wait-

ing area on both sides of the main door. From the reception, the nurse will screen/triage the mother, and either tell her it's not time, or forward her to the Active Labour Room. This room, unlike in most facilities nowadays, is a place meant to keep mothers active and this speeds up labour time. Hence the reduced number of beds. If mothers are incentivized to walk around, use the inner courtyard and exercise lightly, they would lay down less. The check up corner in the Active Labour Room is meant to be used for monitoring the dilation and when it reaches 6 or 7 cm, it's time to head to the Delivery Room.

After the delivery, mother and father (or family member) should stay 1 to 2 hours in that same room, having skin to skin contact with the baby and recovering. The benefit of having a private room is that there is time and space for the family to enjoy a quiet time, while still being monitored by the medical staff in the nearby Nurses' Station. The private Delivery Rooms have their own toilet with shower head.

The next step is the Postnatal Ward, where mothers recover the rest of the time, and can be discharged in 24h, sometimes less, depending on the condition and recovery speed. This room has 6 beds, 2 of them for C-section mothers - who are more susceptible to infections - hence the longer wall for more protection. Again, in this room there is a check up corner for the nurse to monitor healing and recovery. The neonatal room is in between the Postnatal Ward and the Nurses' Station, so that it is easy to monitor and still close to the mothers. The temperature and light

in this room should be stable and controlled, hence its interior location.

Each bed benefits from its own window, a feature repeated throughout the whole project. If the families chose so, they can also stay in one of the three private rooms for an extra fee.

Before being discharged, mothers pass through the Doctor's Room, where they receive the final check up and counseling. This is the last step of the journey for normal deliveries, and the families can go home.

There are other supporting functions inside the facility. One of them is the ANC space. ANC means Antenatal Care and is defined by WHO "as the care provided by skilled health-care professionals to pregnant women in order to ensure the best health conditions for both mother and baby during pregnancy". WHO recommends a minimum of four ANC visits before delivery. In this space there are two screening bays, that can function simultaneously, depending on the staff available, a waiting area and desk. The ANC space is located near the entrance so that it does not disturb the running of the labour ward.

Another supporting function inside the facility is the Gynecology Ward. The purpose of this 6-bed ward is to admit women who are pregnant but also have other conditions, for instance malaria.

The operating theater, meant for C-section, is strategically located between the Active Labour Room and the Delivery Room.

These are the stages when complications arise and fast access to the theater is crucial. A secondary emergency access - from the ambulance - is located to the right side of the Nurses' Station. The theater comprises of the operating room, scrubbing/changing room and sluice room, which is where the blood and fluids are thrown and instruments are passed through water before being taken to the sterilization room.

The sterilization room has a key location between the theater and delivery room, which is where instruments to be sterilized come from. Next to it, there's the staff room for breaks and resting.

There are two service 'pockets' in between the wards, with both normal and accessible toilets.

The inner courtyard not only provides natural light for the wards but also acts as a cooling agent, helping to clean the air and promote natural ventilation. At the same time, it brings a green space inside the facility for users to enjoy.

There are 24 sinks spread throughout the facility to promote handwashing and prevent spreading infections.

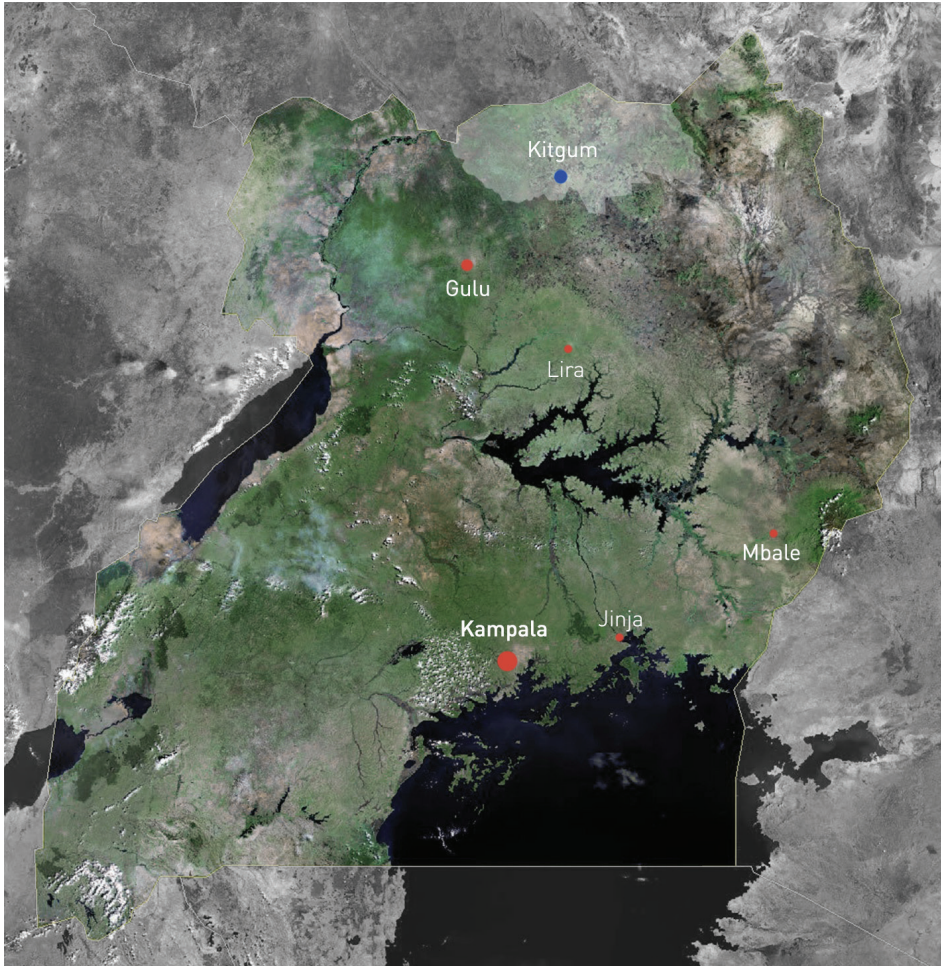
The Delivery Rooms and Postnatal Ward are oriented in this way because these are the main functions that need to grow in case of an extension. By placing them in the side where the plot is free, they can easily be extended in the future, if the facility increases the number of births per month.

The Administration and Admission Wards building is smaller and accommodates supporting rooms for the existing Yotkom Medical Center. After entering in the building, there is a reception and waiting area with a 6-bed Men's Ward to the left, and a 6-bed Children's Ward to the right. Through the back door, the nurses from this building can easily communicate with the labour ward building, in case of staff shortage. The left wing has an ultrasound room and a vaccination room.

Disconnected from this block by a covered corridor is the administration section, with two offices connected by a shared staff room, where trainings and meetings can take place. There is also the laboratory in the northern corner. Yotkom has a laboratory now but it's facing south and extremely hot, so this would become the new one. The Administration building is connected to the Yotkom building by a walkway.

In both buildings, the windows are composed by a metal frame with security bars and a mosquito net. Since the climate allows it, the use of glass has been avoided due to its cost (except in the operating theater and neonatal room).

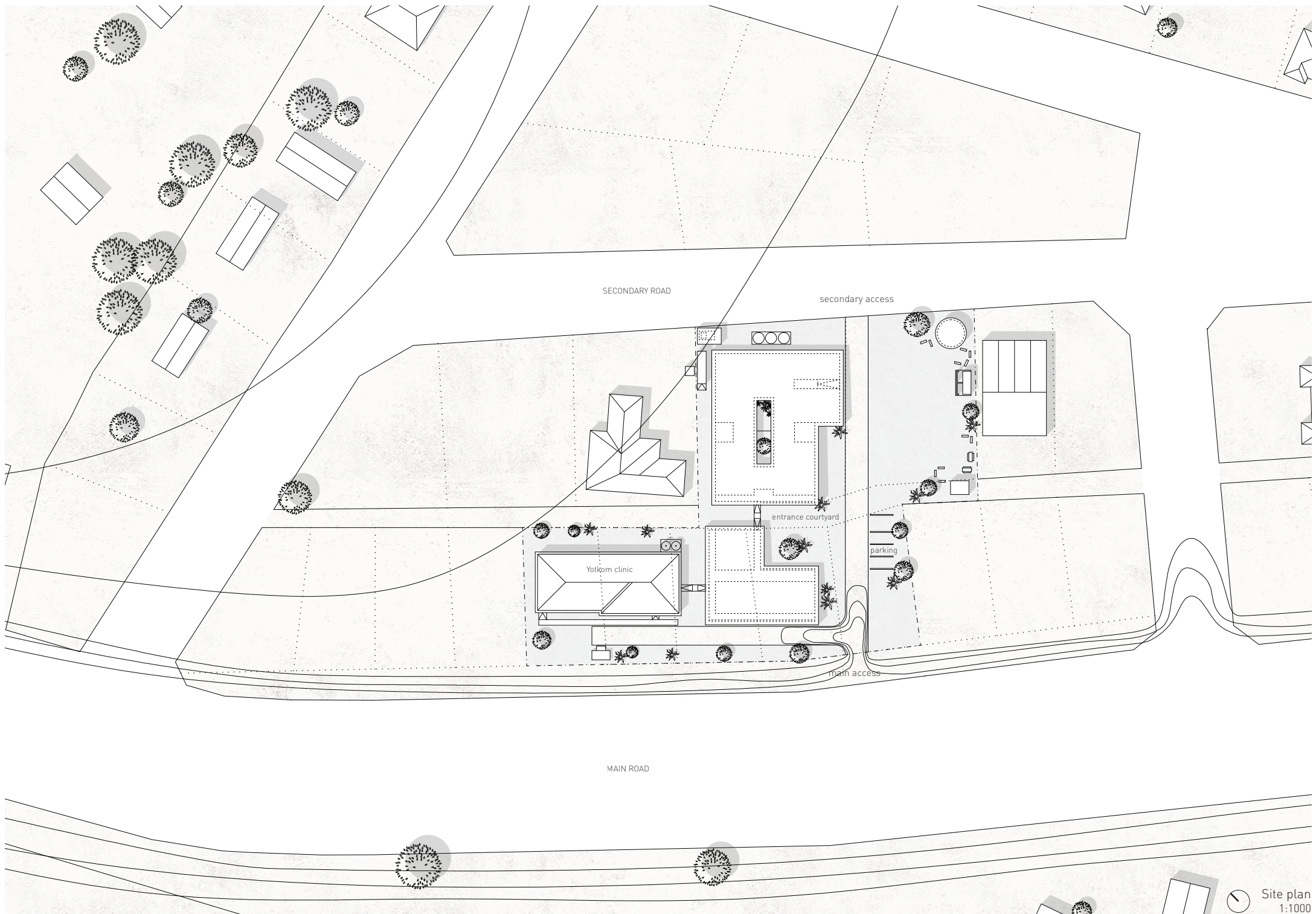
Rainwater is collected from the roof surface to a back gutter and three water tanks. The corrugation of the metal sheets is oriented from the front to the back to help conduct the water towards the back. In the back of the plot there is also a small garbage disposal unit and an incinerator of medical waste. All these functions are close to the back gate, so that it's easy to access and empty.



KITGUM TOWN

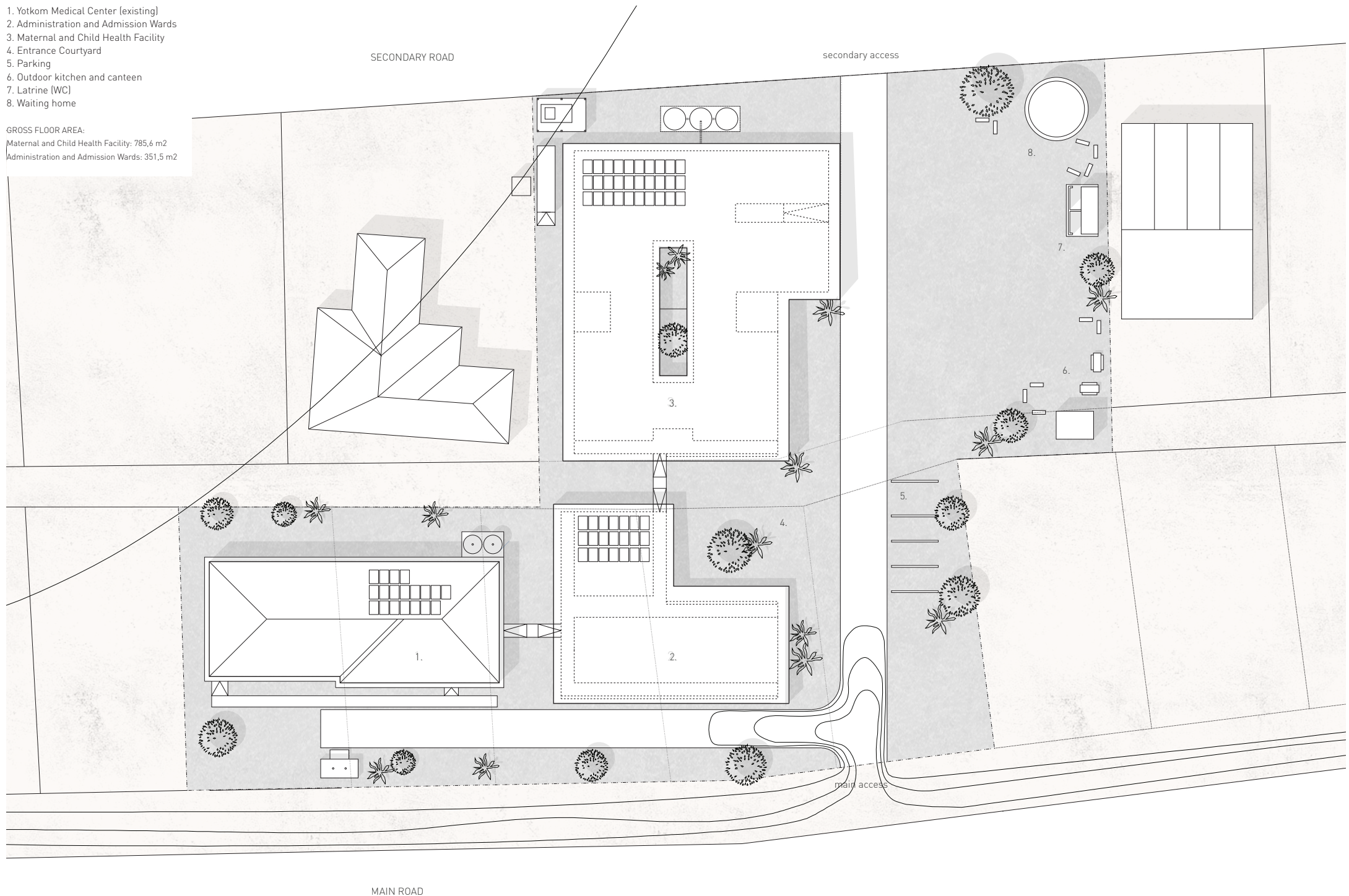


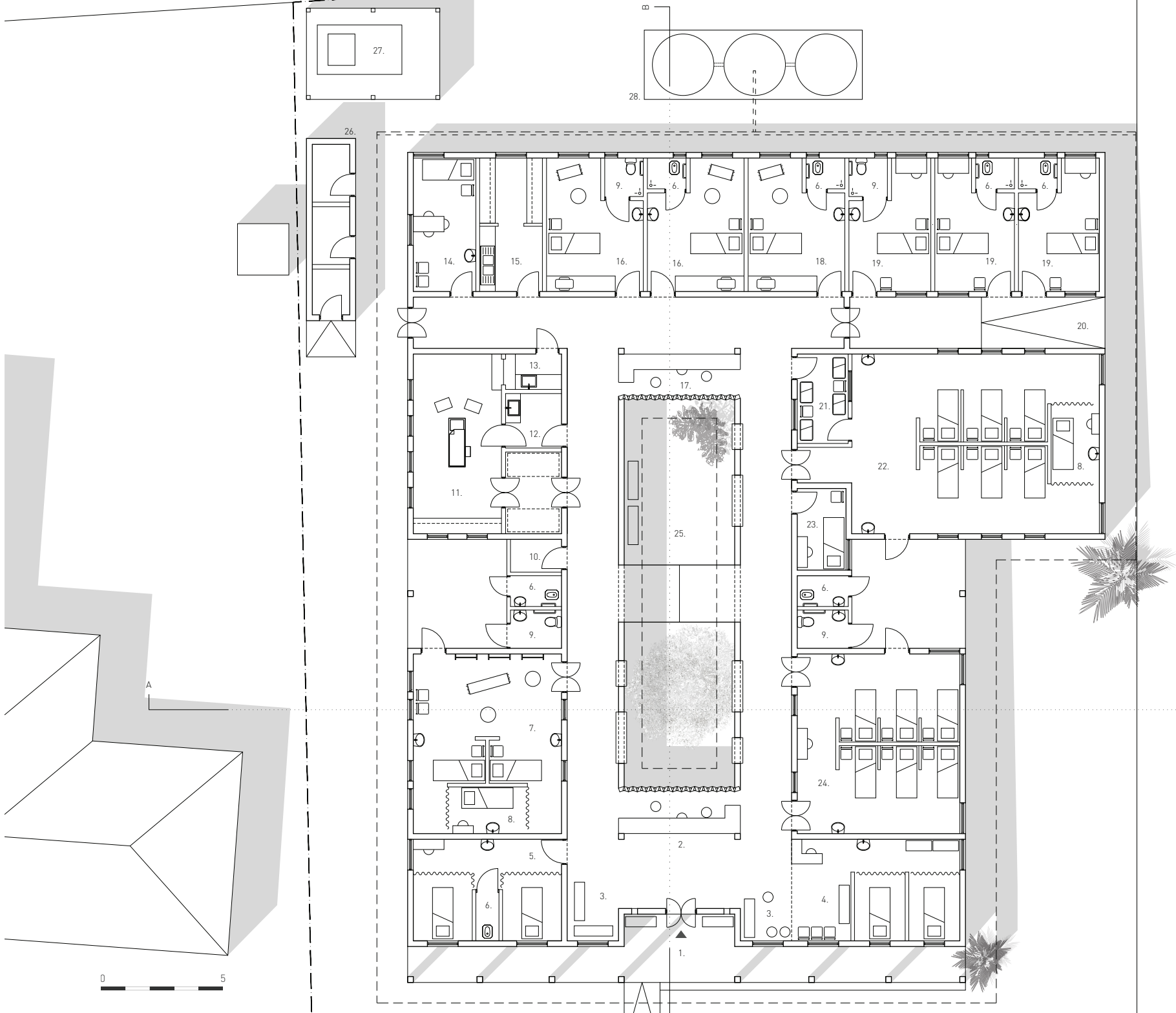
YOTKOM MEDICAL CENTER
focus area



1. Yotkom Medical Center (existing)
2. Administration and Admission Wards
3. Maternal and Child Health Facility
4. Entrance Courtyard
5. Parking
6. Outdoor kitchen and canteen
7. Latrine (WC)
8. Waiting home

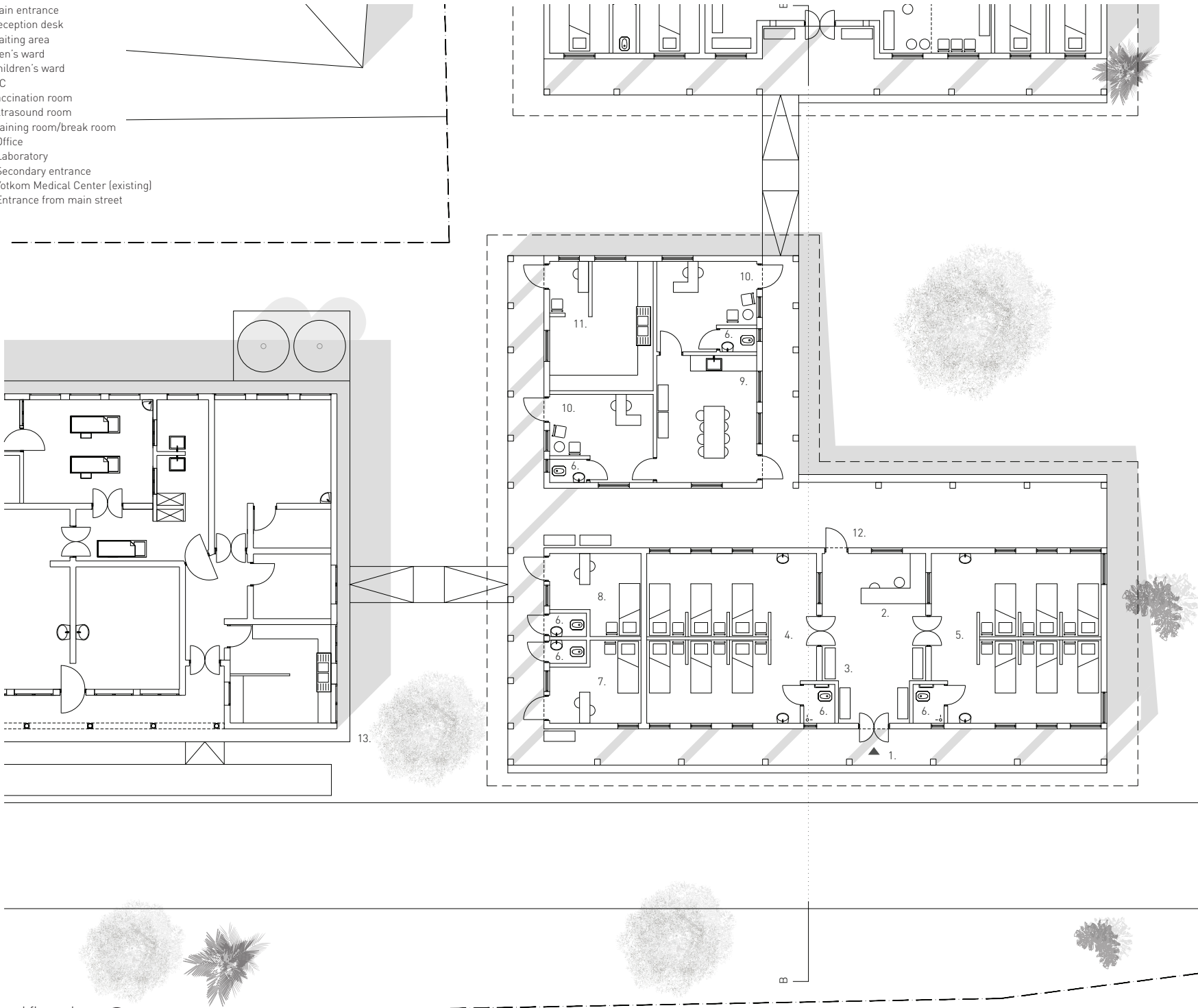
GROSS FLOOR AREA:
 Maternal and Child Health Facility: 785,6 m²
 Administration and Admission Wards: 351,5 m²





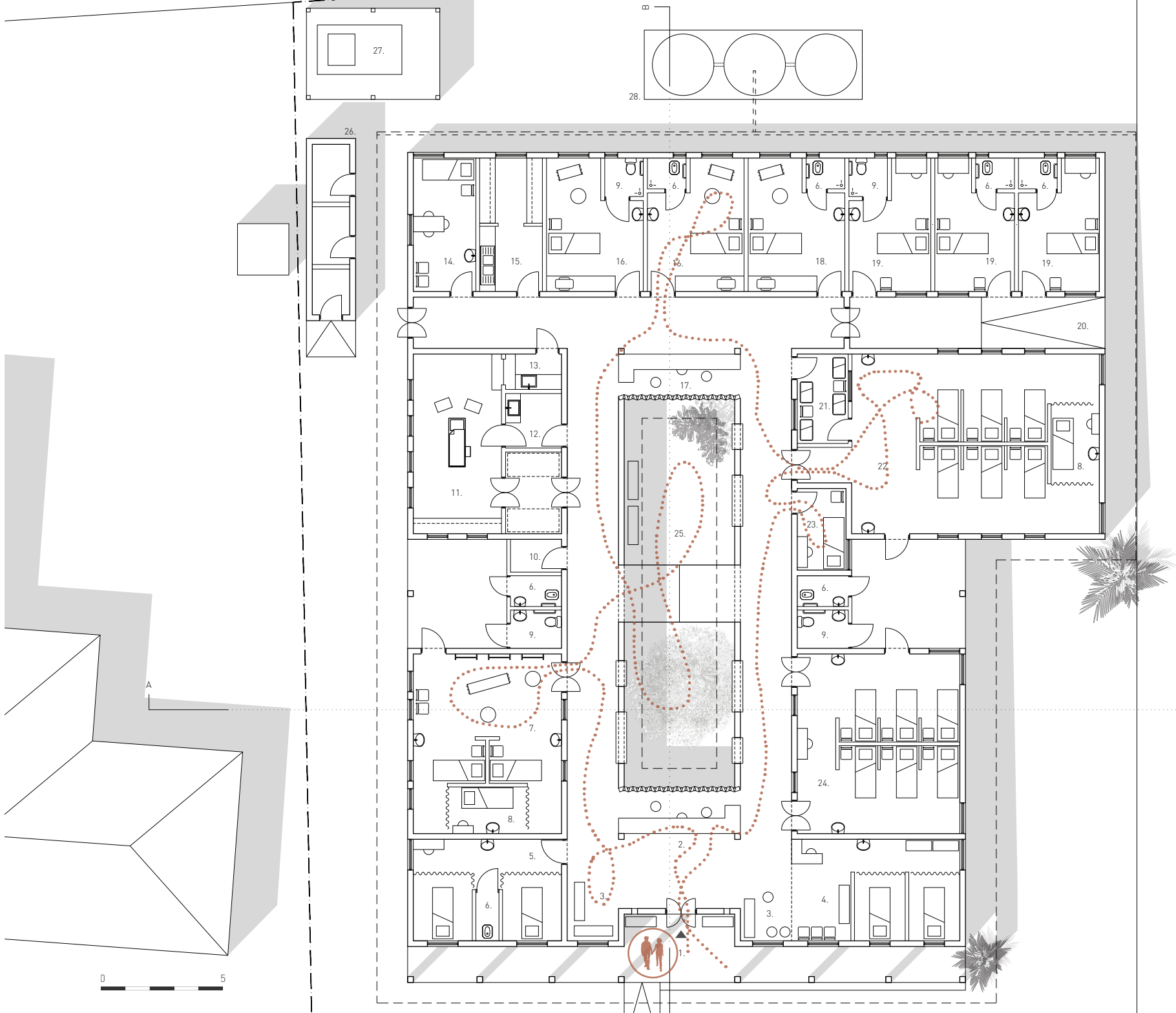
1. Main entrance
2. Reception desk
3. Waiting area
4. ANC (antenatal care)
5. Screening/triage
6. WC
7. Active Labour Room
8. Check-up
9. WC (accessible)
10. Storage
11. Operating theater
12. Scrubbing/changing room
13. Sluice
14. Staff
15. Sterilization
16. Delivery room
17. Nurses' station
18. Multipurpose room
19. Private room
20. Emergency entrance
21. Neonatal room
22. Postnatal ward (6 beds)
23. Doctor's room
24. Gynecology ward (6 beds)
25. Interior courtyard
26. Garbage disposal
27. Incinerator
28. Water tanks (3x 10 000l)

- 1. Main entrance
- 2. Reception desk
- 3. Waiting area
- 4. Men's ward
- 5. Children's ward
- 6. WC
- 7. Vaccination room
- 8. Ultrasound room
- 9. Training room/break room
- 10. Office
- 11. Laboratory
- 12. Secondary entrance
- 13. Yotkom Medical Center (existing)
- 14. Entrance from main street



Ground floor plan
1:200

0 5



1. Main entrance
2. Reception desk
3. Waiting area
4. ANC (antenatal care)
5. Screening/triage
6. WC
7. Active Labour Room
8. Check-up
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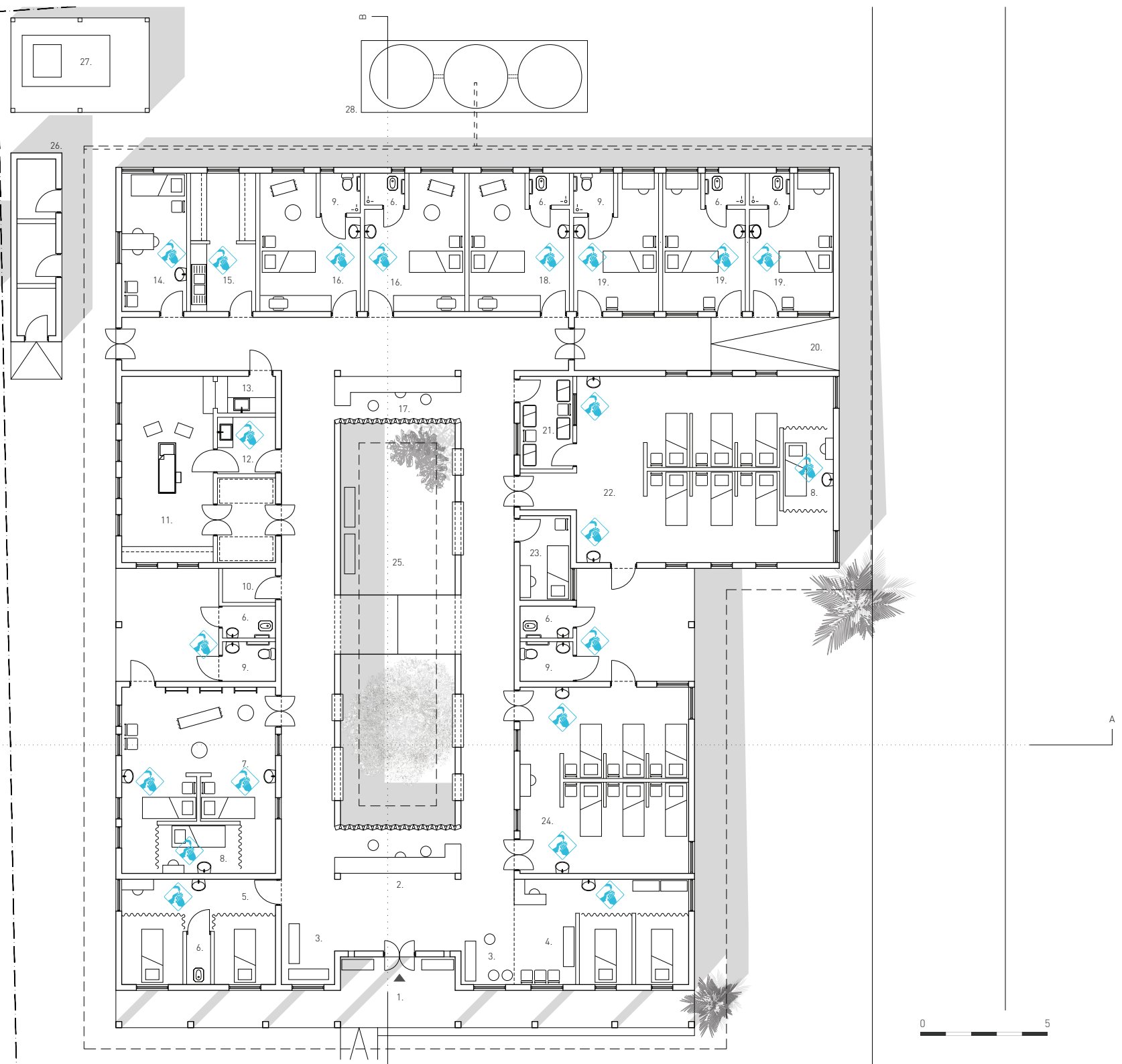
movement of companion
example

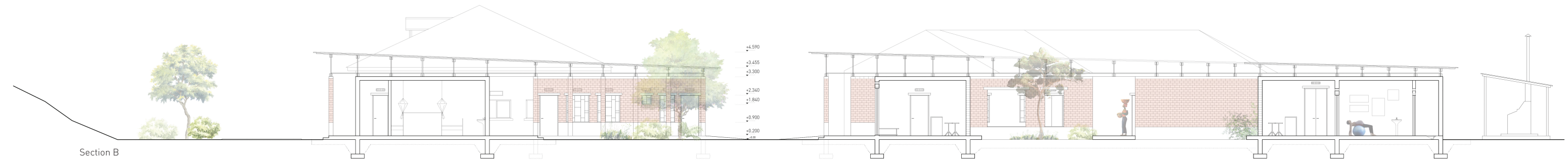
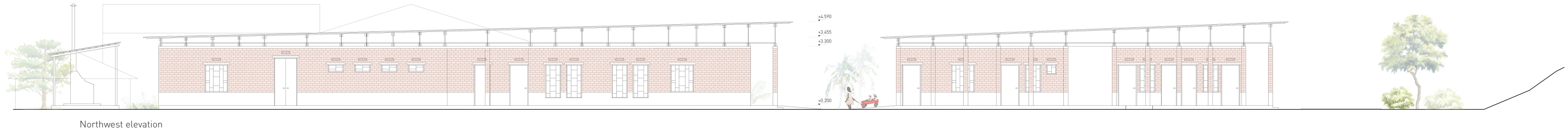
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25. Interior courtyard
26. Garbage disposal
27. Incinerator
28. Water tanks (3x 10 000l)



sink

HYGIENE FLOW
Ground floor plan
1:200



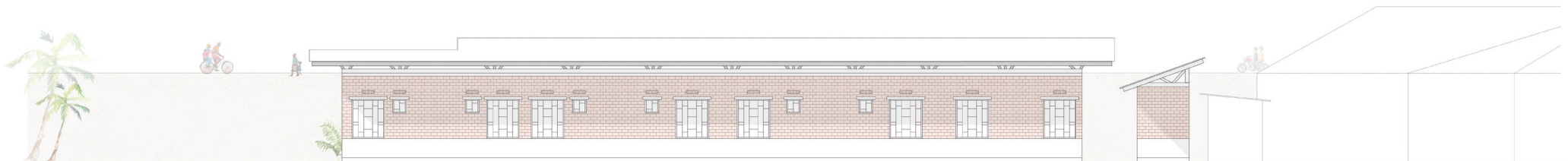




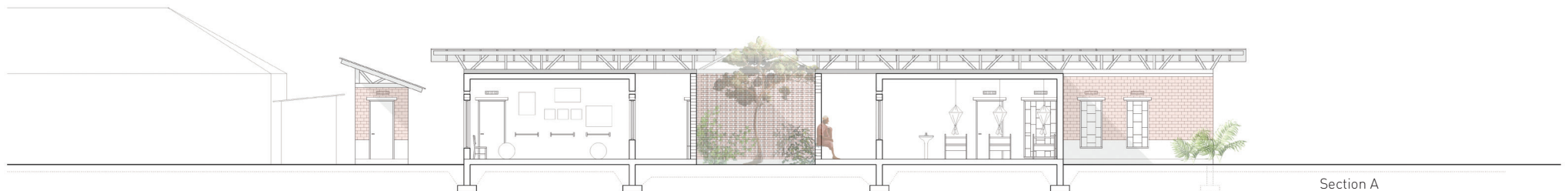
Southwest elevation 1



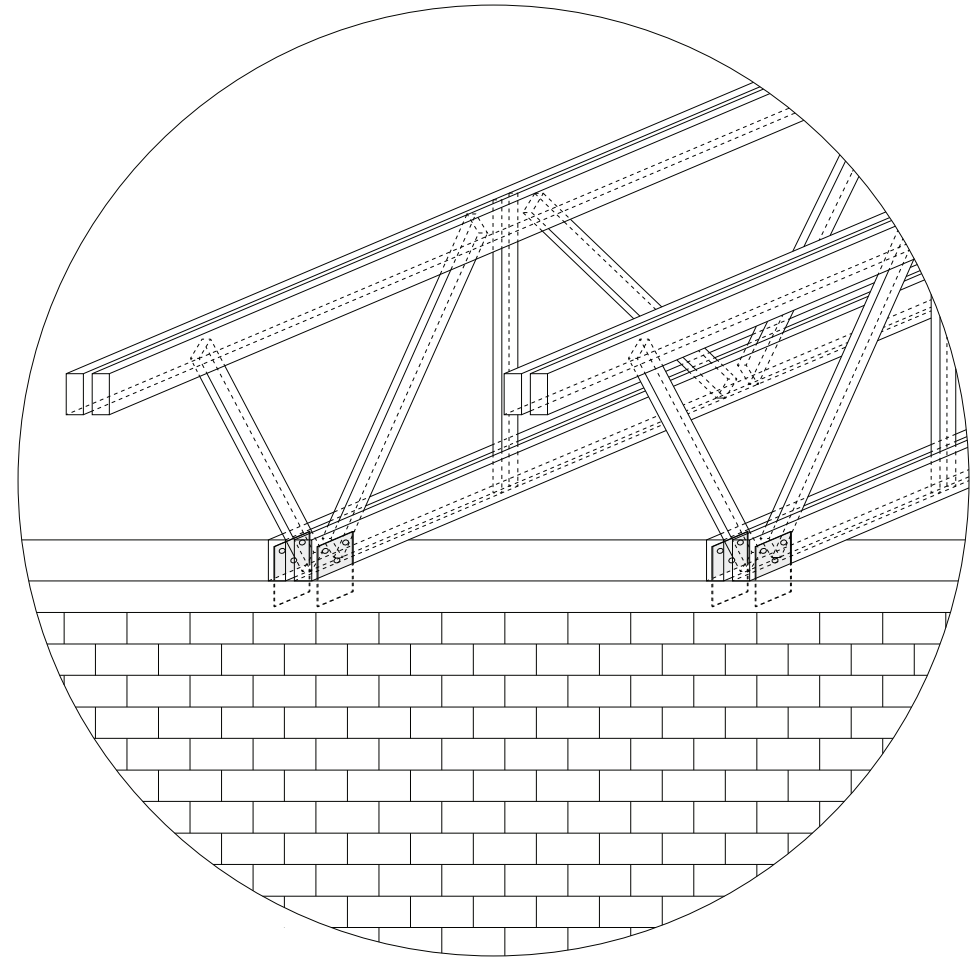
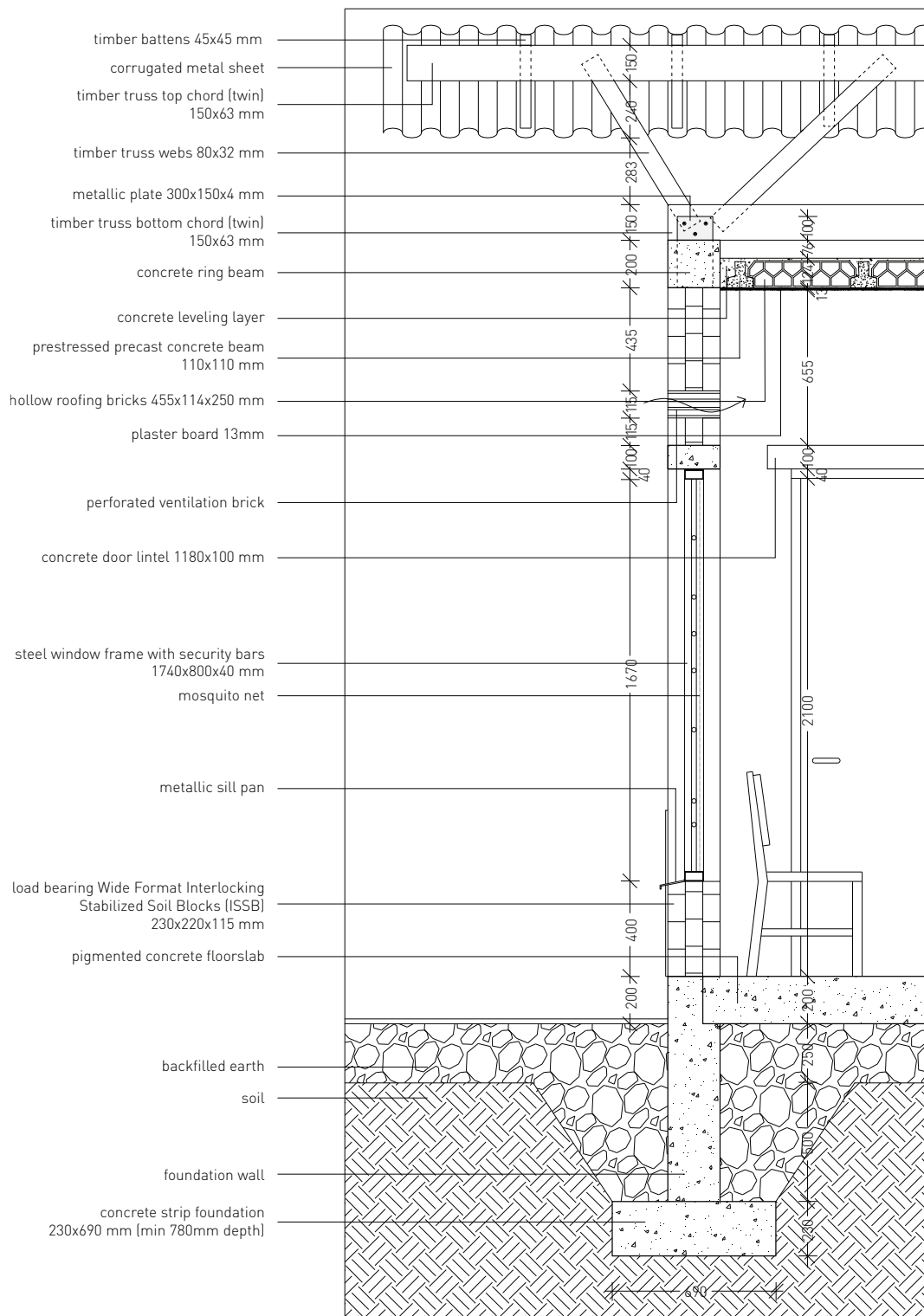
Southwest elevation 2



Northeast elevation

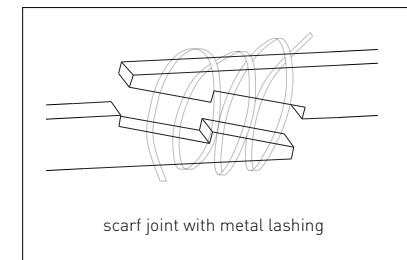


Section A



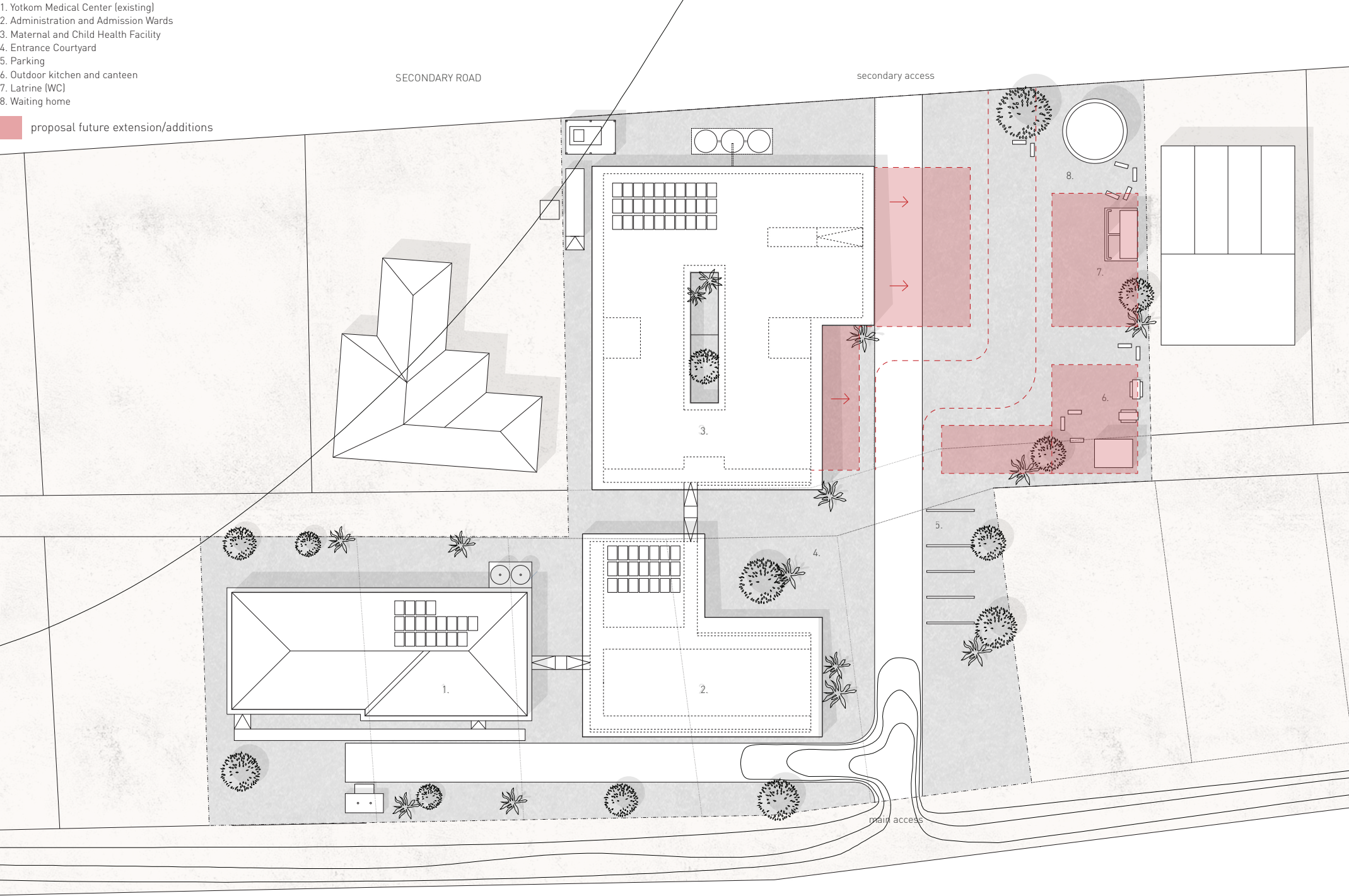
Trusses are anchored to the walls with a metallic plate which is set on the concrete right after pouring. The concrete ring beam runs through the perimeter walls of the building to allow truss fixation. Traditionally in Uganda, beams and truss chords are joined with a scarf joint with metal lashing to bridge wider spans.

The common timber used for roof structures is eucalyptus, due to its wide availability in the country.



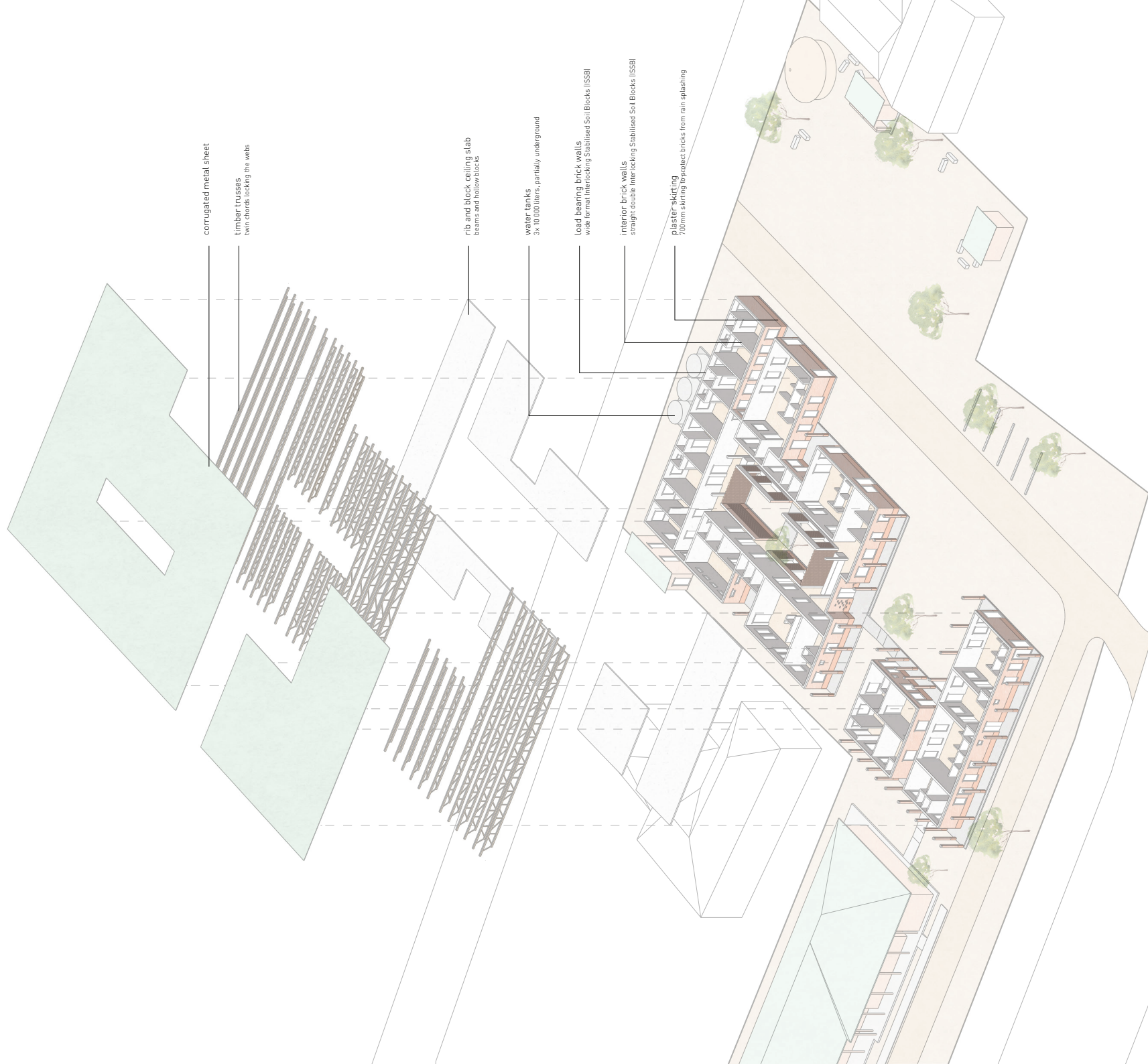
- 1. Yotkom Medical Center (existing)
- 2. Administration and Admission Wards
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- 6. Outdoor kitchen and canteen
- 7. Latrine (WC)
- 8. Waiting home

proposal future extension/additions



Proposal of extension plan
1:500

MAIN ROAD



corrugated metal sheet

timber trusses
twin chords locking the webs

rib and block ceiling slab
beams and hollow blocks

water tanks
5x 10 000 liters, partially underground

load bearing brick walls
wide format Interlocking Stabilised Soil Blocks (ISSB)

interior brick walls
straight double interlocking Stabilised Soil Blocks (ISSB)

plaster skirting
700mm skirting to protect bricks from rain splashing



View towards the main entrance of the Labour Ward and entrance courtyard



View of the entrance courtyard and both buildings



View of the central interior courtyard of the Labour Ward



Interior view of the reception and ANC area

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Aalto University - School of Arts, Design and Architecture

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